

# Defining archetypes of mixed-use developments using Google Maps API data

## Journal Article

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## Section A: Google Place types and programme types

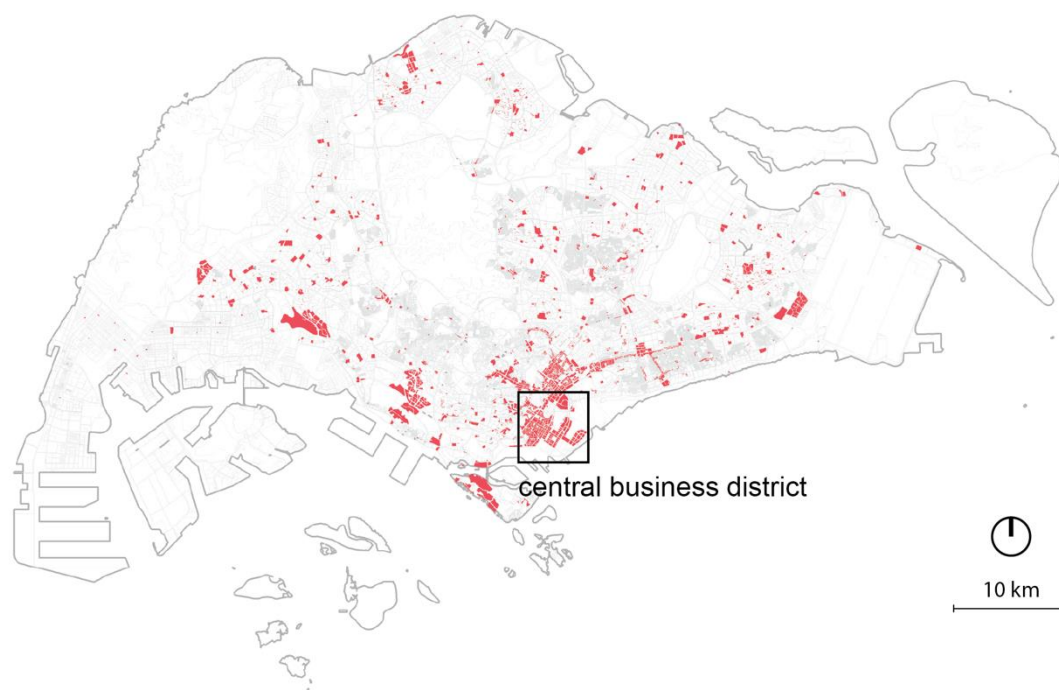


Figure S1. Mixed-use plots in Singapore. The plots highlighted in red are assigned one of the ten mixed-use zoning types in the Singapore Master Plan 2019.

The 46 Google Place types are beauty\_salon, hair\_care, spa, pharmacy, liquor\_store, laundry, convenience\_store, movie\_rental, locksmith, florist, hardware\_store, restaurant, bar, cafe, gym, bowling\_alley, dentist, doctor, physiotherapist, pet\_store, veterinary\_care, bank, post\_office, embassy, home\_goods\_store, car\_repair, car\_wash, bicycle\_store, jewellery\_store, night\_club, art\_gallery, museum, library, book\_store, school, electronics\_store, car\_dealer, car\_rental, furniture\_store, clothing\_store, shoe\_store, supermarket, department\_store, lodging, movie\_theatre and casino.

Table S1: 36 programme types correspond to one or multiple Google Place types.

Programme types	Google Place types
BeautyService	beauty_salon, hair_care, spa
Pharmacy	pharmacy
LiquorStore	liquor_store
Laundry	laundry
ConvenienceStore	convenience_store
MovieRental	movie_rental
Locksmith	locksmith
Florist	florist
HardwareStore	hardware_store
Restaurant	restaurant
Bar/Cafe	bar, cafe
HealthService	doctor, dentist, doctor, physiotherapist
PetStore/VeterinaryCare	pet_store, veterinary_care

Bank/PostOffice	bank, post_office
Embassy	embassy
HomeGoodsStore	home_goods_store
CarRepair/CarWash	car_repair, car_wash
BicycleStore	bicycle_store
JewelleryStore	jewellery_store
Gym	gym
BowlingAlley	bowling_alley
NightClub	night_club
ArtGallery	art_gallery
Museum	museum
Library	library
BookStore	book_store
School	school
ElectronicsStore	electronics_store
CarDealer/CarRental	car_rental, car_dealer
FurnitureStore	furniture_store
ClothingStore/ShoeStore	clothing_store, shoe_store
Supermarket	supermarket
DepartmentStore	department_store
Lodging	lodging
MovieTheatre	movie_theatre
Casino	casino

## Section B: four substeps of programme profile formulation (Step 3 of methodology)

In this section, we explain our four-substep method in-detail for programme profile formulation, which is summarised and illustrated in Figure S2.

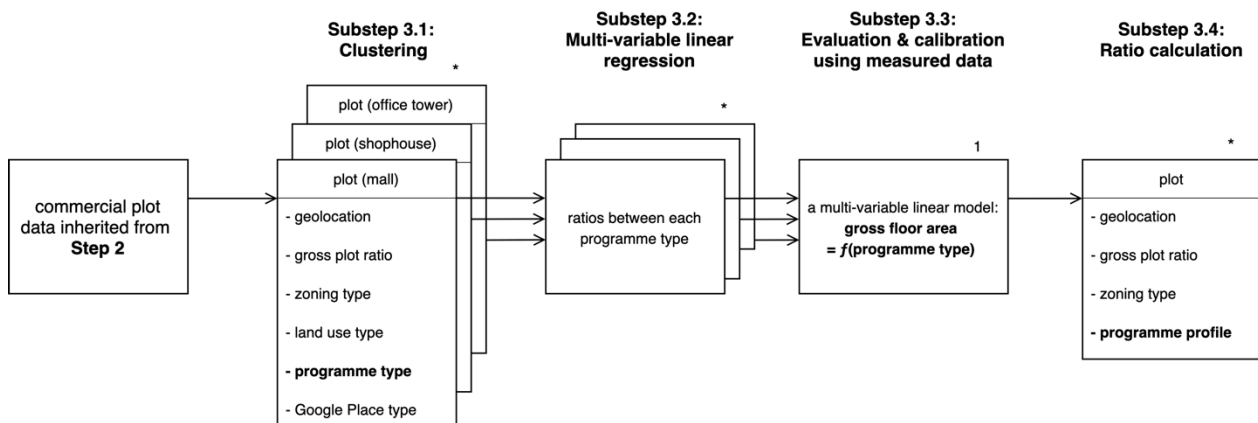


Figure S2. Our method to determine each programme type's typical unit size has four sub-steps.

### Substep 3.1: Clustering

Even when focusing on the commercial plots, it proved difficult to find reasonable estimates of each programme type's floor area by solving the multivariate equations mentioned in Step 3 of the Methodology Section. This is because commercial plots encompass vastly different kinds of developments, showing significant variability with respect to the presence of unknown programme types (i.e. residential, office, hotel room).

Figure S3 shows three different types of built form commonly found in Singaporean commercial zones: office towers, malls and historical shophouses. A typical shophouse plot has a GPR of  $\sim 2.5$  and contains a few commercial functions, but may also contain residential or office functions. A typical mall plot has a GPR of  $\sim 3$  and a very high number of programmes, with no residential or office functions. An office tower plot typically has a GPR of  $\sim 10$ , with most of the floor area being devoted to office functions and only a small share to the programme types in our list in Table S1.

We clustered the commercial plots to find more homogeneous groups of plots that contain similar or the same unknown programme type. After a comparison of different methods, we chose to cluster the plots using Ward's method for agglomerative hierarchical clustering (Milligan, 1980; SAS Institute Inc., 2019), based on each plot's GPR and programme count (the total number of all Google Places in that plot). This method was best able to distinguish between what are intuitively the main kinds of commercial plot types in Singapore, mentioned above: office towers, malls and shophouses. Our clustering ultimately resulted in five clusters, consisting of malls, mega malls, shophouses, office towers and a "leftover" cluster whose plots did not clearly fit any of these categories. Then, the multivariate equations to find programme profiles could be solved for those clusters of plots with little unknown floor area and a large plot count, in this case, the shophouse and mall clusters. In our data, these two types of commercial plots contain each of the 36 programme types in our ontology and combined they account for  $\sim 77\%$  of all mixed-use commercial plots and  $\sim 28\%$  of all the mixed-use plots that have full data (i.e. plots that also have a GPR listed in the master plan). All the non-commercial plots (the other nine mixed-use zoning types) contain a few of the programme types and are much less common than the commercial plots. These non-commercial plots were not used in the multivariate linear regression in the next sub-step.



Figure S3. Three types of commercial plots in Singapore that differ significantly with respect to the number of Google places and GPR: (a) malls; (b) office buildings in the central business district; and (c) historical shophouses.

### Substep 3.2: Multivariate linear regression

In the second substep, we fit multivariate linear regression models to the commercial plots of malls and shophouses to solve for the floor area of each of our 36 programme types. When sampling the data used for the regression (i.e. plot data sets containing 36 plots), we used the circular systematic sampling technique to ensure that all plot data had the same probability of being sampled. We applied it in two steps. First, we calculated the sampling interval, which equals the total sample size divided by  $n = 36$ . Second, by iterating over the plots in the dataset and selecting every  $n$ th plot in each iteration, we created a total number of plot data samples equalling the total number of plots. To create more samples, we shuffled the data and repeated these two steps 100 times for both the mall and shophouse clusters.

Multivariate regression could then be performed on this data with the assumption that each plot's built GFA equals the weighted sum of the floor areas of each programme type found on the plot, as follows:

$$GFA_j = \sum_{i=1}^n (S_i \times C_{i,j}) + U_j \quad (\text{Equation 1})$$

Here,  $n$  is the number of programme types to 36 in our application;  $i$  is the ordinal number of a programme type in the list [-];  $j$  ranges from 1 to the total number of plots [-] (the total number of shophouse plots equals 750, and that of the malls equals 99);  $C$ , representing the variables in the linear regression model, is a programme type's count of occurrences [-];  $S$ , representing the weights of the variables in the linear regression model, is a programme's typical unit size [ $m^2$ ]; and  $U$ , representing the bias in the linear regression model, is the GFA of the unknown programmes outside the list of 36 programme types, such as the office programme type in an office tower. Each plot  $j$  has a permissible GFA ( $pGFA$ ) [ $m^2$ ], calculated as

$$pGFA_j = A_j \times GPR_j \quad (\text{Equation 2})$$

where  $j$  ranges from 1 to the total plot number [-],  $A$  is the plot's area [ $m^2$ ], and  $GPR$  is the plot's GPR [-] as listed in the master plan.

It is important to highlight that, as we did not have access to data on the actual built GFA for each plot, in this model, we assumed that each plot's built GFA equals its total permissible GFA set in the master plan (through the listed GPR). Built GFA could be both lower than permissible GFA (e.g. plots for which GPR has been increased, but where new or additional development has not taken place) or higher (e.g. through bonus GFA granted to developers when integrating certain policies, features, or amenities). Hence, this modelling assumption will introduce some inaccuracies, which are straightforward to resolve once accurate as-built GFA data becomes available.

Theoretically, feeding  $n$  sets of plot data into Equations 1 and 2 may inform the weights ( $S$ ) and the bias ( $U$ ) to fit the multivariate linear regression model. A multivariate regression model was fitted for each set of 36 mixed-use plot data using Tensorflow, an open-source software library for machine learning maintained by Google, which is often used to build classification or prediction models in urban science (Vázquez-Canteli et al., 2019; Yao et al., 2017). We divided the data into training and validation sets at a ratio of 0.8 and 0.2, respectively. We used the training data to build the multivariate linear regression model using the Keras.Sequential model and the Adam Optimizer. The validation data was then used to test the model to avoid over-fitting. The tolerances for training and validating the model were kept at 0.2 and 0.03 in Mean Absolute Percentage Error.

In all, 884 models were created for the combined clusters of malls and shophouses. The weights of each linear regression model can be considered as the typical sizes of the programme type ( $R$  [ $m^2$ ]) and the bias as the floor area of the unknown programme type. Many of these 884 models did not have a weight for all 36 programme types. This is because the sampled sets of 36 plots combined did not contain all 36 programme types. In such cases, we filled the missing weight of a programme type with that of a known similar programme type. Table S2 shows how we divided the 36 programme types into five groups of similar size, based on the authors' professional judgement. Whenever a programme type in a regression model had a missing weight, we replaced the missing value with the average weight of known programme types belonging to the same group in Table S2.

Table S2: Five groups of programme types of similar unit sizes, used to replace missing programme types with similar alternatives.

Group	36 programme types	Substep 3.3 : Model selection and calibration
A	BeautyService, Pharmacy, LiquorStore, Laundry, ConvenienceStore, MovieRental, Locksmith, Florist, HardwareStore	
B	Restaurant, Bar, HealthService, PetStore/VeterinaryCare, Bank/PostOffice, Embassy, HomeGoodsStore, CarRepair/CarWash, BicycleStore, JewelleryStore	
C	Gym, BowlingAlley, NightClub, ArtGallery, Museum, Library, BookStore, School, ElectronicsStore, CarDealer/CarRental, FurnitureStore, ClothingStore/ShoeStore	
D	Supermarket, DepartmentStore, Lodging, MovieTheatre	
E	Casino	

In the next sub-step, we reduced the resulting 884 linear regression models down to a single one through processes of selection and calibration. We evaluated the models by comparing their predicted results for programme profiles (i.e. the mix of programmes and their typical floor areas) to a measured programme profile of a particular plot. This plot contained a mega mall and no unknown programme types, allowing us to eliminate the unknown types from the calibration. We derived its programme profile by tracing the mall's floor plan and calculating the floor areas of its 500 Google Places, grouped by programme type. Of our 36 programme types, 27 were represented in the measured data. Such a highly diverse mix of programme types was the reason for using this plot for calibration.

We used clustering to identify those multivariate regression models that yielded programme profiles most similar to the measured data. First, we merged the measured programme profile with the 884 modelled profiles, resulting in a dataset of 885 programme profiles. We then performed hierarchical clustering on the set. Finally, we selected all the regression models with programme profiles belonging to the same cluster as the measured programme profile.

Then, we calibrated the weights of the variables in the selected models relative to our benchmark plot's measured data using Equation 3, scaling our selected regression model's GFA to equal that of the benchmark mega mall plot.

$$R_{i,j} = \frac{GFA_x}{\sum_{i=1,j=1}^{n,m} (R_{i,j} \times C_{i,x})} \times S_{i,j} \quad (\text{Equation 3})$$

Here,  $n$  is the number of programme types in the measured plot [-];  $i$  is the ordinal number of the programme types in the list of types [-];  $m$  is the number of linear models selected for calibration [-];  $j$  is the ordinal number of the linear models in the list of models [-];  $S$  is the weight of the variables in the linear models [-];  $GFA_x$  is the measured plot's  $GFA$  [ $m^2$ ], which is 135,721 in this demonstration;  $C_x$  is the count of each programme type [-] in the measured plot as in Table 1 in the main text.

Then, we merged these models and used the mean of the calibrated weights ( $\overline{R_{i,j}}$  [ $m^2$ ]) to produce the final multivariate linear equation, which models a plot's floor area ( $gGFA$ ) for the 36 programme types based on the Google data, which should be the same or less than a plot's permissible GFA.

$$gGFA = \sum_{i=1}^{n=36} (\overline{R_{i,j}} \times C_i) \quad (\text{Equation 4})$$

### Substep 3.4: Programme ratio calculation

In the fourth and final sub-step, we formulated programme profiles for each plot in our data (including non-commercial plots). This was done by applying the calibrated linear regression model (i.e. Equation 4) to all 3,064 mixed-use plots and calculating the floor areas of each programme type found on the plot. When the GFA of the 36 known programme types ( $gGFA$  [ $m^2$ ]) is smaller than the plot's permissible GFA ( $pGFA$  [ $m^2$ ]), the difference equals the floor area of the plot's unknown programme type ( $uS$  [ $m^2$ ]).

When  $gGFA_j$  is greater or equal to  $pGFA_j$ , the plot's unknown programme types are not considered, as shown in Equations 5 and 6.

$$A_{i,j} = \begin{cases} \frac{pGFA_j}{gGFA_j} \times (R_i \times C_{i,j}), & \text{when } gGFA_j \geq pGFA_j \\ R_j \times C_{i,j}, & \text{when } gGFA_j < pGFA_j \end{cases} \quad (\text{Equation 5})$$

$$uS_j = pGFA_j - gGFA_j \quad (\text{Equation 6})$$

Here,  $i$  is a programme type's ordinal number in the list of 36 programme types, ranging from 1 to 36 [-];  $j$  ranges from 1 to the total plot number [-];  $A$  is a programme's GFA in a plot [ $m^2$ ];  $C$  is a programme type's count in a plot [-].

Two programme types, in particular, office and residential, represent the vast majority of unknown (i.e. other) programme types ( $uS$ ) present in Singapore's ten mixed-use zoning types. A final modelling question was how to address casinos, which were not present in the plots used to create the linear regression model, as there are only two casinos in Singapore. We chose to set the floor area of casinos at 30,000 [ $m^2$ ], as both of Singapore's casinos have a floor area of  $\sim 30,000 m^2$  (Genting Singapore, 2021; Sands Casino, 2018).

# Section C: Programme profiles for individual mixed-use plots

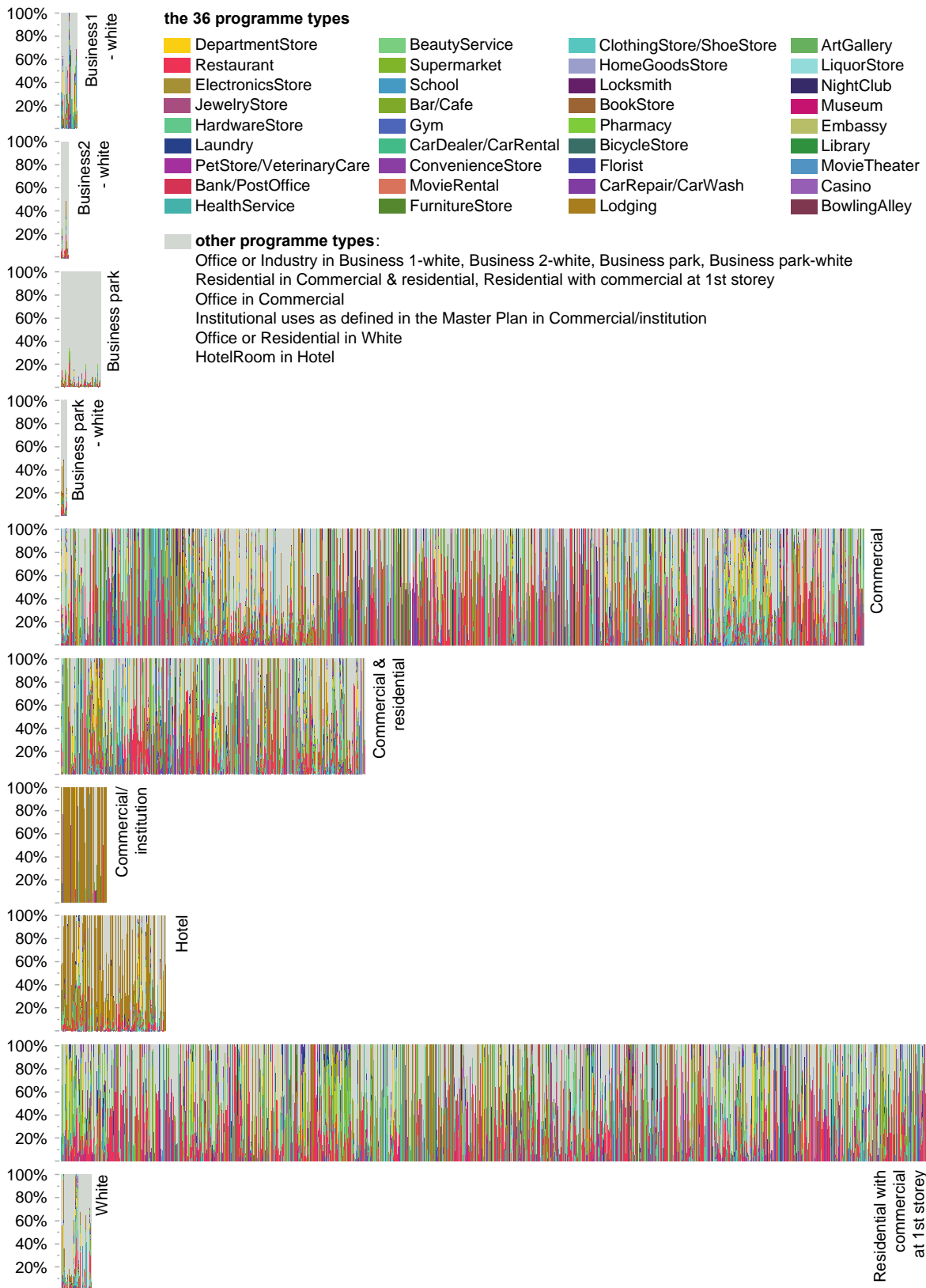


Figure S4. Programme profiles formulated for all the 3,064 plots by zoning types.



## Section D: Ontology contents

This section describes the contents of the OntoMixedUseZoning ontology.

*Table S3: Description Logic terms and axioms representing the relationships between ZoningTypes and LandUseTypes in the ontology.*

Term	Axiom
Business1 White	$\sqsubseteq \text{ZoningType } \sqcap \forall \text{ allowsUse.}(\text{CleanIndustry } \sqcup \text{LightIndustry } \sqcup \text{Residential } \sqcup \text{Office } \sqcup \text{ServicedApartment } \sqcup \text{RecreationClub } \sqcup \text{Association } \sqcup \text{Commercial } \sqcup \text{Hotel } \sqcup \text{Entertainment } \sqcup \text{ConventionOrExhibitionCentre})$
Business2 White	$\sqsubseteq \text{ZoningType } \sqcap \forall \text{ allowsUse.}(\text{CleanIndustry } \sqcup \text{LightIndustry } \sqcup \text{GeneralIndustry } \sqcup \text{Residential } \sqcup \text{Office } \sqcup \text{ServicedApartment } \sqcup \text{RecreationClub } \sqcup \text{Association } \sqcup \text{ConventionOrExhibitionCentre } \sqcup \text{Commercial } \sqcup \text{Hotel } \sqcup \text{Entertainment})$
Business Park	$\sqsubseteq \text{ZoningType } \sqcap \forall \text{ allowsUse.}(\text{BusinessPark } \sqcup \text{SciencePark } \sqcup \text{Residential } \sqcup \text{Office } \sqcup \text{ServicedApartment } \sqcup \text{RecreationClub } \sqcup \text{Association } \sqcup \text{Commercial } \sqcup \text{Hotel } \sqcup \text{Entertainment } \sqcup \text{ConventionOrExhibitionCentre})$
Business Park White	$\sqsubseteq \text{ZoningType } \sqcap \forall \text{ allowsUse.}(\text{BusinessPark } \sqcup \text{SciencePark } \sqcup \text{Residential } \sqcup \text{Office } \sqcup \text{ServicedApartment } \sqcup \text{RecreationClub } \sqcup \text{Association } \sqcup \text{Commercial } \sqcup \text{Hotel } \sqcup \text{Entertainment } \sqcup \text{ConventionOrExhibitionCentre})$
Commercial Commercial And Residential	$\sqsubseteq \text{ZoningType } \sqcap \forall \text{ allowsUse.}(\text{Commercial } \sqcup \text{Office } \sqcup \text{ConventionOrExhibitionCentre } \sqcup \text{ForeignTradeMission } \sqcup \text{Entertainment})$
Commercial Or Institution	$\sqsubseteq \text{ZoningType } \sqcap \forall \text{ allowsUse.}(\text{Commercial } \sqcup \text{Hotel } \sqcup \text{Residential } \sqcup \text{Office})$ $\sqsubseteq \text{ZoningType } \sqcap \forall \text{ allowsUse.}(\text{Commercial } \sqcup \text{Office } \sqcup \text{CommunityInstitution } \sqcup \text{Entertainment}) \sqcap \forall \text{ mayAllowUse.}(\text{Commercial})$
Hotel Zone Residential With Commercial At First Storey	$\sqsubseteq \text{ZoningType } \sqcap \forall \text{ allowsUse.}(\text{Hotel } \sqcup \text{BackpackersHostel}) \sqcap \forall \text{ mayAllowUse.}(\text{Commercial } \sqcup \text{Residential})$
White	$\sqsubseteq \text{ZoningType } \sqcap \forall \text{ allowsUse.}(\text{CommercialWithoutDisamenity } \sqcup \text{Commercial } \sqcup \text{Residential})$ $\sqsubseteq \text{ZoningType } \sqcap \forall \text{ allowsUse.}(\text{Residential } \sqcup \text{Office } \sqcup \text{ServicedApartment } \sqcup \text{RecreationClub } \sqcup \text{Association } \sqcup \text{Commercial } \sqcup \text{Hotel } \sqcup \text{Entertainment } \sqcup \text{ConventionOrExhibitionCentre})$

*Table S4: Description Logic terms and axioms representing the relationships between LandUseTypes and ProgrammeTypes in the ontology.*

Term	Axiom
Association	$\sqsubseteq \text{LandUse}$
Backpackers Hostel	$\sqsubseteq \text{LandUse } \sqcap \forall \text{ mayAllowProgramme.}(\text{Lodging})$
Business Park	$\sqsubseteq \text{LandUse}$
Clean Industry	$\sqsubseteq \text{LandUse}$
Commercial	$\sqsubseteq \text{LandUse } \sqcap \forall \text{ mayAllowProgramme.}(\text{BeautyService } \sqcup \text{Pharmacy } \sqcup \text{LiquorStore } \sqcup \text{Laundry } \sqcup \text{ConvenienceStore } \sqcup \text{MovieRental } \sqcup \text{Locksmith } \sqcup \text{Florist } \sqcup \text{HardwareStore } \sqcup \text{Restaurant } \sqcup \text{Bar/Cafe } \sqcup \text{HealthService } \sqcup \text{PetStore/VeterinaryCare } \sqcup \text{Bank/PostOffice } \sqcup \text{Embassy } \sqcup \text{HomeGoodsStore } \sqcup \text{CarRepair/CarWash } \sqcup \text{BicycleStore } \sqcup \text{JewelryStore } \sqcup \text{Gym } \sqcup \text{BowlingAlley } \sqcup \text{NightClub } \sqcup \text{ArtGallery } \sqcup \text{Museum } \sqcup \text{Library } \sqcup \text{BookStore } \sqcup \text{School } \sqcup \text{ElectronicsStore } \sqcup \text{CarDealer/CarRental } \sqcup \text{FurnitureStore})$

	ClothingStore/ShoeStore ⊔ Supermarket ⊔ DepartmentStore ⊔ MovieTheater ) $\sqsubseteq$ LandUse $\sqcap$ $\forall$ mayAllowProgramme.(BeautyService ⊔ Pharmacy ⊔ LiquorStore ⊔ Laundry ⊔ ConvenienceStore ⊔ MovieRental ⊔ Locksmith ⊔ Florist ⊔ HardwareStore ⊔ Restaurant ⊔ Bar/Cafe ⊔ HealthService ⊔ PetStore/VeterinaryCare ⊔ Bank/PostOffice ⊔ Embassy ⊔ HomeGoodsStore ⊔ CarRepair/CarWash ⊔ BicycleStore ⊔ JewelryStore ⊔ Gym ⊔ BowlingAlley ⊔ ArtGallery ⊔ Museum ⊔ Library ⊔ BookStore ⊔ School ⊔ ElectronicsStore ⊔ CarDealer/CarRental ⊔ FurnitureStore ⊔ ClothingStore/ShoeStore ⊔ Supermarket ⊔ DepartmentStore ⊔ MovieTheater )
Commercial Without Disamenity Community Institution	$\sqsubseteq$ LandUse
Convention Or Exhibition Centre	$\sqsubseteq$ LandUse
Entertainment	$\sqsubseteq$ LandUse $\sqcap$ $\forall$ mayAllowProgramme.(MovieTheater ⊔ Casino )
Foreign Trade	
Mission	$\sqsubseteq$ LandUse
General Industry	$\sqsubseteq$ LandUse
Hotel	$\sqsubseteq$ LandUse $\sqcap$ $\forall$ mayAllowProgramme.Lodging
Light Industry	$\sqsubseteq$ LandUse
Office	$\sqsubseteq$ LandUse
Recreation Club	$\sqsubseteq$ LandUse
Residential	$\sqsubseteq$ LandUse
Science Park	$\sqsubseteq$ LandUse
Serviced Apartment	$\sqsubseteq$ LandUse $\sqcap$ $\forall$ mayAllowProgramme.Lodging

*Table S5: Description Logic terms and axioms representing the hierarchy of ProgrammeTypes included in the ontology, as well as the sources of each ProgrammeType.*

Term	Axiom
ArtGallery	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
Bank/PostOffice	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.()
Bar/Cafe	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.()
BeautyService	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.()
BicycleStore	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
BookStore	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
BowlingAlley	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
CarDealer/CarRental	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.()
CarRepair/CarWash	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.()
Casino	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
ClothingStore/ShoeStore	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.()
ConvenienceStore	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
DepartmentStore	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
ElectronicsStore	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
Embassy	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
Florist	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
FurnitureStore	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
Gym	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
HardwareStore	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
HealthService	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.()

HomeGoodsStore	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
JewelryStore	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
Laundry	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
Library	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
LiquorStore	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
Locksmith	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
Lodging	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
MovieRental	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
MovieTheater	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
Museum	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
NightClub	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
Office	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
PetStore/VeterinaryCare	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.()
Pharmacy	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
Restaurant	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
School	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
Supermarket	$\sqsubseteq$ ProgrammeType $\sqcap$ $\forall$ hasSource.Google
Bank	$\sqsubseteq$ Bank/PostOffice $\sqcap$ $\forall$ hasSource.Google
Bar	$\sqsubseteq$ Bar/Cafe $\sqcap$ $\forall$ hasSource.Google
BeautySalon	$\sqsubseteq$ BeautyService $\sqcap$ $\forall$ hasSource.Google
Cafe	$\sqsubseteq$ Bar/Cafe $\sqcap$ $\forall$ hasSource.Google
CarDealer	$\sqsubseteq$ CarDealer/CarRental $\sqcap$ $\forall$ hasSource.Google
CarRental	$\sqsubseteq$ CarDealer/CarRental $\sqcap$ $\forall$ hasSource.Google
CarRepair	$\sqsubseteq$ CarRepair/CarWash $\sqcap$ $\forall$ hasSource.Google
CarWash	$\sqsubseteq$ CarRepair/CarWash $\sqcap$ $\forall$ hasSource.Google
ClothingStore	$\sqsubseteq$ ClothingStore/ShoeStore $\sqcap$ $\forall$ hasSource.Google
Dentist	$\sqsubseteq$ HealthService $\sqcap$ $\forall$ hasSource.Google
Doctor	$\sqsubseteq$ HealthService $\sqcap$ $\forall$ hasSource.Google
HairCare	$\sqsubseteq$ BeautyService $\sqcap$ $\forall$ hasSource.Google
PetStore	$\sqsubseteq$ PetStore/VeterinaryCare $\sqcap$ $\forall$ hasSource.Google
Physiotherapist	$\sqsubseteq$ HealthService $\sqcap$ $\forall$ hasSource.Google
PostOffice	$\sqsubseteq$ Bank/PostOffice $\sqcap$ $\forall$ hasSource.Google
ShoeStore	$\sqsubseteq$ ClothingStore/ShoeStore $\sqcap$ $\forall$ hasSource.Google
Spa	$\sqsubseteq$ BeautyService $\sqcap$ $\forall$ hasSource.Google
VeterinaryCare	$\sqsubseteq$ PetStore/VeterinaryCare $\sqcap$ $\forall$ hasSource.Google

Table S6: Description Logic terms and axioms representing the Archetypes and their zones, GPR values and constituent components.

Term	Axiom
AT001	$\sqsubseteq$ Archetype $\sqcap$ $\forall$ hasZone Business1White $\sqcap$ $\forall$ hasGPR 3.0 $\sqcap$ $\forall$ hasComponent.(AT001_C1 $\sqcup$ AT001_C2 $\sqcup$ AT001_C3 $\sqcup$ AT001_C4 $\sqcup$ AT001_C5 $\sqcup$ AT001_C6 $\sqcup$ AT001_C7 $\sqcup$ AT001_C8 $\sqcup$ AT001_C9 $\sqcup$ AT001_C10)
AT002	$\sqsubseteq$ Archetype $\sqcap$ $\forall$ hasZone Business1White $\sqcap$ $\forall$ hasGPR 3.0 $\sqcap$ $\forall$ hasComponent.(AT002_C1 $\sqcup$ AT002_C2 $\sqcup$ AT002_C3 $\sqcup$ AT002_C4 $\sqcup$ AT002_C5 $\sqcup$ AT002_C6 $\sqcup$ AT002_C7 $\sqcup$ AT002_C8 $\sqcup$ AT002_C9 $\sqcup$ AT002_C10 $\sqcup$ AT002_C11 $\sqcup$ AT002_C12 $\sqcup$ AT002_C13 $\sqcup$ AT002_C14 $\sqcup$ AT002_C15 $\sqcup$ AT002_C16 $\sqcup$ AT002_C17)
AT003	$\sqsubseteq$ Archetype $\sqcap$ $\forall$ hasZone Business1White $\sqcap$ $\forall$ hasGPR 3.5 $\sqcap$ $\forall$ hasComponent.(AT003_C1 $\sqcup$ AT003_C2 $\sqcup$ AT003_C3 $\sqcup$ AT003_C4 $\sqcup$ AT003_C5 $\sqcup$ AT003_C6 $\sqcup$ AT003_C7 $\sqcup$ AT003_C8 $\sqcup$

AT003\_C9 ⊔AT003\_C10 ⊔AT003\_C11 ⊔AT003\_C12)  
 AT004 ⊔Archetype Γ∇ hasZone Business1White Γ∇ hasGPR 3.5 Γ∇ hasComponent.(AT004\_C1 ⊔  
 AT004\_C2 ⊔AT004\_C3 ⊔AT004\_C4 ⊔AT004\_C5 ⊔AT004\_C6 ⊔AT004\_C7 ⊔AT004\_C8)  
 AT005 ⊔Archetype Γ∇ hasZone Business2White Γ∇ hasGPR 3.5 Γ∇ hasComponent.(AT005\_C1 ⊔  
 AT005\_C2 ⊔AT005\_C3 ⊔AT005\_C4 ⊔AT005\_C5 ⊔AT005\_C6 ⊔AT005\_C7 ⊔AT005\_C8 ⊔  
 AT005\_C9 ⊔AT005\_C10)  
 AT006 ⊔Archetype Γ∇ hasZone Business2White Γ∇ hasGPR 3.0 Γ∇ hasComponent.(AT006\_C1 ⊔  
 AT006\_C2 ⊔AT006\_C3 ⊔AT006\_C4 ⊔AT006\_C5)  
 AT007 ⊔Archetype Γ∇ hasZone BusinessPark Γ∇ hasGPR 1.2 Γ∇ hasComponent.(AT007\_C1 ⊔  
 AT007\_C2 ⊔AT007\_C3 ⊔AT007\_C4 ⊔AT007\_C5 ⊔AT007\_C6 ⊔AT007\_C7)  
 AT008 ⊔Archetype Γ∇ hasZone BusinessPark Γ∇ hasGPR 2.5 Γ∇ hasComponent.(AT008\_C1 ⊔  
 AT008\_C2 ⊔AT008\_C3 ⊔AT008\_C4 ⊔AT008\_C5 ⊔AT008\_C6 ⊔AT008\_C7 ⊔AT008\_C8 ⊔  
 AT008\_C9 ⊔AT008\_C10 ⊔AT008\_C11)  
 AT009 ⊔Archetype Γ∇ hasZone BusinessPark Γ∇ hasGPR 2.0 Γ∇ hasComponent.(AT009\_C1 ⊔  
 AT009\_C2 ⊔AT009\_C3)  
 AT010 ⊔Archetype Γ∇ hasZone BusinessPark Γ∇ hasGPR 2.5 Γ∇ hasComponent.(AT010\_C1 ⊔  
 AT010\_C2 ⊔AT010\_C3 ⊔AT010\_C4)  
 AT011 ⊔Archetype Γ∇ hasZone BusinessPark Γ∇ hasGPR 2.5 Γ∇ hasComponent.(AT011\_C1 ⊔  
 AT011\_C2 ⊔AT011\_C3 ⊔AT011\_C4 ⊔AT011\_C5 ⊔AT011\_C6 ⊔AT011\_C7 ⊔AT011\_C8 ⊔  
 AT011\_C9 ⊔AT011\_C10 ⊔AT011\_C11 ⊔AT011\_C12)  
 AT012 ⊔Archetype Γ∇ hasZone BusinessPark Γ∇ hasGPR 4.8 Γ∇ hasComponent.(AT012\_C1 ⊔  
 AT012\_C2 ⊔AT012\_C3 ⊔AT012\_C4)  
 AT013 ⊔Archetype Γ∇ hasZone BusinessPark Γ∇ hasGPR 4.6 Γ∇ hasComponent.(AT013\_C1 ⊔  
 AT013\_C2 ⊔AT013\_C3)  
 AT014 ⊔Archetype Γ∇ hasZone BusinessParkWhite Γ∇ hasGPR 10.0 Γ∇ hasComponent.(AT014\_C1 ⊔  
 AT014\_C2 ⊔AT014\_C3 ⊔AT014\_C4 ⊔AT014\_C5 ⊔AT014\_C6 ⊔AT014\_C7 ⊔AT014\_C8 ⊔  
 AT014\_C9 ⊔AT014\_C10 ⊔AT014\_C11 ⊔AT014\_C12 ⊔AT014\_C13 ⊔AT014\_C14 ⊔AT014\_C15  
 ⊔AT014\_C16)  
 AT015 ⊔Archetype Γ∇ hasZone Commercial Γ∇ hasGPR 2.8 Γ∇ hasComponent.(AT015\_C1 ⊔  
 AT015\_C2 ⊔AT015\_C3 ⊔AT015\_C4 ⊔AT015\_C5 ⊔AT015\_C6 ⊔AT015\_C7 ⊔AT015\_C8 ⊔  
 AT015\_C9 ⊔AT015\_C10 ⊔AT015\_C11 ⊔AT015\_C12 ⊔AT015\_C13 ⊔AT015\_C14 ⊔AT015\_C15  
 ⊔AT015\_C16 ⊔AT015\_C17)  
 AT016 ⊔Archetype Γ∇ hasZone Commercial Γ∇ hasGPR 4.2 Γ∇ hasComponent.(AT016\_C1)  
 AT017 ⊔Archetype Γ∇ hasZone Commercial Γ∇ hasGPR 5.6 Γ∇ hasComponent.(AT017\_C1 ⊔  
 AT017\_C2 ⊔AT017\_C3 ⊔AT017\_C4 ⊔AT017\_C5 ⊔AT017\_C6 ⊔AT017\_C7)  
 AT018 ⊔Archetype Γ∇ hasZone Commercial Γ∇ hasGPR 4.2 Γ∇ hasComponent.(AT018\_C1 ⊔  
 AT018\_C2)  
 AT019 ⊔Archetype Γ∇ hasZone Commercial Γ∇ hasGPR 4.2 Γ∇ hasComponent.(AT019\_C1 ⊔  
 AT019\_C2 ⊔AT019\_C3 ⊔AT019\_C4)  
 AT020 ⊔Archetype Γ∇ hasZone Commercial Γ∇ hasGPR 8.4 Γ∇ hasComponent.(AT020\_C1)  
 AT021 ⊔Archetype Γ∇ hasZone Commercial Γ∇ hasGPR 4.9 Γ∇ hasComponent.(AT021\_C1 ⊔  
 AT021\_C2 ⊔AT021\_C3 ⊔AT021\_C4)  
 AT022 ⊔Archetype Γ∇ hasZone Commercial Γ∇ hasGPR 4.2 Γ∇ hasComponent.(AT022\_C1)  
 AT023 ⊔Archetype Γ∇ hasZone Commercial Γ∇ hasGPR 8.4 Γ∇ hasComponent.(AT023\_C1 ⊔  
 AT023\_C2 ⊔AT023\_C3 ⊔AT023\_C4 ⊔AT023\_C5 ⊔AT023\_C6 ⊔AT023\_C7 ⊔AT023\_C8 ⊔  
 AT023\_C9 ⊔AT023\_C10)  
 AT024 ⊔Archetype Γ∇ hasZone Commercial Γ∇ hasGPR 5.6 Γ∇ hasComponent.(AT024\_C1 ⊔  
 AT024\_C2 ⊔AT024\_C3 ⊔AT024\_C4)  
 AT025 ⊔Archetype Γ∇ hasZone Commercial Γ∇ hasGPR 4.2 Γ∇ hasComponent.(AT025\_C1 ⊔  
 AT025\_C2 ⊔AT025\_C3 ⊔AT025\_C4)  
 AT026 ⊔Archetype Γ∇ hasZone Commercial Γ∇ hasGPR 4.2 Γ∇ hasComponent.(AT026\_C1 ⊔

AT026\_C2 ⊔AT026\_C3)  
 AT027 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 3.0 ⊔hasComponent.(AT027\_C1 ⊔  
 AT027\_C2 ⊔AT027\_C3 ⊔AT027\_C4 ⊔AT027\_C5 ⊔AT027\_C6 ⊔AT027\_C7 ⊔AT027\_C8 ⊔  
 AT027\_C9 ⊔AT027\_C10 ⊔AT027\_C11 ⊔AT027\_C12 ⊔AT027\_C13 ⊔AT027\_C14 ⊔AT027\_C15  
 ⊔AT027\_C16 ⊔AT027\_C17 ⊔AT027\_C18 ⊔AT027\_C19 ⊔AT027\_C20 ⊔AT027\_C21)  
 AT028 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 5.6 ⊔hasComponent.(AT028\_C1 ⊔  
 AT028\_C2 ⊔AT028\_C3 ⊔AT028\_C4 ⊔AT028\_C5 ⊔AT028\_C6 ⊔AT028\_C7)  
 AT029 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 4.2 ⊔hasComponent.(AT029\_C1 ⊔  
 AT029\_C2 ⊔AT029\_C3 ⊔AT029\_C4 ⊔AT029\_C5 ⊔AT029\_C6 ⊔AT029\_C7 ⊔AT029\_C8)  
 AT030 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 3.0 ⊔hasComponent.(AT030\_C1 ⊔  
 AT030\_C2 ⊔AT030\_C3 ⊔AT030\_C4)  
 AT031 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 3.0 ⊔hasComponent.(AT031\_C1 ⊔  
 AT031\_C2)  
 AT032 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 3.0 ⊔hasComponent.(AT032\_C1 ⊔  
 AT032\_C2)  
 AT033 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 3.0 ⊔hasComponent.(AT033\_C1 ⊔  
 AT033\_C2)  
 AT034 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 3.0 ⊔hasComponent.(AT034\_C1 ⊔  
 AT034\_C2)  
 AT035 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 3.0 ⊔hasComponent.(AT035\_C1 ⊔  
 AT035\_C2)  
 AT036 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 3.0 ⊔hasComponent.(AT036\_C1 ⊔  
 AT036\_C2)  
 AT037 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 1.4 ⊔hasComponent.(AT037\_C1)  
 AT038 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 3.0 ⊔hasComponent.(AT038\_C1 ⊔  
 AT038\_C2)  
 AT039 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 3.0 ⊔hasComponent.(AT039\_C1 ⊔  
 AT039\_C2 ⊔AT039\_C3 ⊔AT039\_C4 ⊔AT039\_C5 ⊔AT039\_C6 ⊔AT039\_C7)  
 AT040 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 1.4 ⊔hasComponent.(AT040\_C1)  
 AT041 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 3.0 ⊔hasComponent.(AT041\_C1 ⊔  
 AT041\_C2)  
 AT042 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 1.4 ⊔hasComponent.(AT042\_C1 ⊔  
 AT042\_C2)  
 AT043 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 3.0 ⊔hasComponent.(AT043\_C1 ⊔  
 AT043\_C2)  
 AT044 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 3.0 ⊔hasComponent.(AT044\_C1 ⊔  
 AT044\_C2 ⊔AT044\_C3 ⊔AT044\_C4 ⊔AT044\_C5 ⊔AT044\_C6)  
 AT045 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 3.0 ⊔hasComponent.(AT045\_C1 ⊔  
 AT045\_C2 ⊔AT045\_C3)  
 AT046 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 3.0 ⊔hasComponent.(AT046\_C1 ⊔  
 AT046\_C2 ⊔AT046\_C3)  
 AT047 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 3.0 ⊔hasComponent.(AT047\_C1 ⊔  
 AT047\_C2)  
 AT048 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 3.5 ⊔hasComponent.(AT048\_C1 ⊔  
 AT048\_C2 ⊔AT048\_C3 ⊔AT048\_C4)  
 AT049 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 3.0 ⊔hasComponent.(AT049\_C1)  
 AT050 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 5.6 ⊔hasComponent.(AT050\_C1 ⊔  
 AT050\_C2 ⊔AT050\_C3 ⊔AT050\_C4 ⊔AT050\_C5 ⊔AT050\_C6 ⊔AT050\_C7 ⊔AT050\_C8 ⊔  
 AT050\_C9 ⊔AT050\_C10 ⊔AT050\_C11 ⊔AT050\_C12 ⊔AT050\_C13 ⊔AT050\_C14 ⊔AT050\_C15  
 ⊔AT050\_C16 ⊔AT050\_C17 ⊔AT050\_C18 ⊔AT050\_C19 ⊔AT050\_C20 ⊔AT050\_C21)  
 AT051 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 10.5 ⊔hasComponent.(AT051\_C1 ⊔

AT051\_C2 ⊔AT051\_C3 ⊔AT051\_C4 ⊔AT051\_C5 ⊔AT051\_C6 ⊔AT051\_C7 ⊔AT051\_C8 ⊔  
 AT051\_C9 ⊔AT051\_C10 ⊔AT051\_C11 ⊔AT051\_C12 ⊔AT051\_C13 ⊔AT051\_C14 ⊔AT051\_C15  
 ⊔AT051\_C16 ⊔AT051\_C17 ⊔AT051\_C18 ⊔AT051\_C19 ⊔AT051\_C20 ⊔AT051\_C21 ⊔  
 AT051\_C22 ⊔AT051\_C23 ⊔AT051\_C24 ⊔AT051\_C25 ⊔AT051\_C26 ⊔AT051\_C27 ⊔  
 AT051\_C28 ⊔AT051\_C29 ⊔AT051\_C30 ⊔AT051\_C31)

AT052 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 2.0 ⊔hasComponent.(AT052\_C1 ⊔  
 AT052\_C2 ⊔AT052\_C3 ⊔AT052\_C4 ⊔AT052\_C5 ⊔AT052\_C6 ⊔AT052\_C7 ⊔AT052\_C8 ⊔  
 AT052\_C9 ⊔AT052\_C10 ⊔AT052\_C11 ⊔AT052\_C12 ⊔AT052\_C13 ⊔AT052\_C14 ⊔AT052\_C15  
 ⊔AT052\_C16 ⊔AT052\_C17 ⊔AT052\_C18 ⊔AT052\_C19)

AT053 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 5.6 ⊔hasComponent.(AT053\_C1 ⊔  
 AT053\_C2 ⊔AT053\_C3 ⊔AT053\_C4 ⊔AT053\_C5 ⊔AT053\_C6 ⊔AT053\_C7 ⊔AT053\_C8 ⊔  
 AT053\_C9 ⊔AT053\_C10 ⊔AT053\_C11 ⊔AT053\_C12 ⊔AT053\_C13 ⊔AT053\_C14 ⊔AT053\_C15  
 ⊔AT053\_C16 ⊔AT053\_C17 ⊔AT053\_C18 ⊔AT053\_C19 ⊔AT053\_C20 ⊔AT053\_C21)

AT054 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 4.2 ⊔hasComponent.(AT054\_C1 ⊔  
 AT054\_C2 ⊔AT054\_C3 ⊔AT054\_C4 ⊔AT054\_C5 ⊔AT054\_C6 ⊔AT054\_C7 ⊔AT054\_C8 ⊔  
 AT054\_C9 ⊔AT054\_C10 ⊔AT054\_C11 ⊔AT054\_C12 ⊔AT054\_C13 ⊔AT054\_C14 ⊔AT054\_C15  
 ⊔AT054\_C16 ⊔AT054\_C17 ⊔AT054\_C18)

AT055 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 3.3 ⊔hasComponent.(AT055\_C1 ⊔  
 AT055\_C2 ⊔AT055\_C3 ⊔AT055\_C4 ⊔AT055\_C5 ⊔AT055\_C6 ⊔AT055\_C7 ⊔AT055\_C8 ⊔  
 AT055\_C9 ⊔AT055\_C10 ⊔AT055\_C11 ⊔AT055\_C12 ⊔AT055\_C13 ⊔AT055\_C14 ⊔AT055\_C15  
 ⊔AT055\_C16 ⊔AT055\_C17 ⊔AT055\_C18 ⊔AT055\_C19 ⊔AT055\_C20)

AT056 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 3.9 ⊔hasComponent.(AT056\_C1 ⊔  
 AT056\_C2 ⊔AT056\_C3 ⊔AT056\_C4 ⊔AT056\_C5 ⊔AT056\_C6 ⊔AT056\_C7 ⊔AT056\_C8 ⊔  
 AT056\_C9 ⊔AT056\_C10 ⊔AT056\_C11 ⊔AT056\_C12)

AT057 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 4.3 ⊔hasComponent.(AT057\_C1 ⊔  
 AT057\_C2 ⊔AT057\_C3 ⊔AT057\_C4 ⊔AT057\_C5 ⊔AT057\_C6 ⊔AT057\_C7 ⊔AT057\_C8 ⊔  
 AT057\_C9 ⊔AT057\_C10 ⊔AT057\_C11 ⊔AT057\_C12 ⊔AT057\_C13 ⊔AT057\_C14 ⊔AT057\_C15  
 ⊔AT057\_C16 ⊔AT057\_C17 ⊔AT057\_C18 ⊔AT057\_C19 ⊔AT057\_C20 ⊔AT057\_C21)

AT058 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 15.0 ⊔hasComponent.(AT058\_C1 ⊔  
 AT058\_C2 ⊔AT058\_C3 ⊔AT058\_C4 ⊔AT058\_C5 ⊔AT058\_C6 ⊔AT058\_C7 ⊔AT058\_C8 ⊔  
 AT058\_C9 ⊔AT058\_C10 ⊔AT058\_C11 ⊔AT058\_C12 ⊔AT058\_C13 ⊔AT058\_C14 ⊔AT058\_C15  
 ⊔AT058\_C16 ⊔AT058\_C17 ⊔AT058\_C18)

AT059 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 8.7 ⊔hasComponent.(AT059\_C1 ⊔  
 AT059\_C2 ⊔AT059\_C3 ⊔AT059\_C4 ⊔AT059\_C5 ⊔AT059\_C6 ⊔AT059\_C7 ⊔AT059\_C8 ⊔  
 AT059\_C9 ⊔AT059\_C10 ⊔AT059\_C11 ⊔AT059\_C12 ⊔AT059\_C13 ⊔AT059\_C14 ⊔AT059\_C15  
 ⊔AT059\_C16 ⊔AT059\_C17 ⊔AT059\_C18 ⊔AT059\_C19 ⊔AT059\_C20 ⊔AT059\_C21 ⊔  
 AT059\_C22)

AT060 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 11.2 ⊔hasComponent.(AT060\_C1 ⊔  
 AT060\_C2 ⊔AT060\_C3 ⊔AT060\_C4 ⊔AT060\_C5 ⊔AT060\_C6 ⊔AT060\_C7 ⊔AT060\_C8 ⊔  
 AT060\_C9 ⊔AT060\_C10 ⊔AT060\_C11 ⊔AT060\_C12 ⊔AT060\_C13 ⊔AT060\_C14 ⊔  
 AT060\_C15)

AT061 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 14.0 ⊔hasComponent.(AT061\_C1 ⊔  
 AT061\_C2 ⊔AT061\_C3 ⊔AT061\_C4 ⊔AT061\_C5 ⊔AT061\_C6 ⊔AT061\_C7 ⊔AT061\_C8 ⊔  
 AT061\_C9 ⊔AT061\_C10 ⊔AT061\_C11 ⊔AT061\_C12 ⊔AT061\_C13 ⊔AT061\_C14 ⊔AT061\_C15  
 ⊔AT061\_C16 ⊔AT061\_C17 ⊔AT061\_C18 ⊔AT061\_C19)

AT062 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 15.0 ⊔hasComponent.(AT062\_C1 ⊔  
 AT062\_C2 ⊔AT062\_C3 ⊔AT062\_C4 ⊔AT062\_C5 ⊔AT062\_C6)

AT063 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 15.0 ⊔hasComponent.(AT063\_C1 ⊔  
 AT063\_C2)

AT064 ⊔Archetype ⊔hasZone Commercial ⊔hasGPR 15.0 ⊔hasComponent.(AT064\_C1 ⊔  
 AT064\_C2 ⊔AT064\_C3 ⊔AT064\_C4 ⊔AT064\_C5 ⊔AT064\_C6 ⊔AT064\_C7 ⊔AT064\_C8 ⊔

AT064\_C9 ⊔AT064\_C10 ⊔AT064\_C11 ⊔AT064\_C12 ⊔AT064\_C13 ⊔AT064\_C14)  
 AT065 ⊒Archetype ⌈hasZone Commercial ⌈hasGPR 15.0 ⌈hasComponent.(AT065\_C1 ⊔  
 AT065\_C2 ⊔AT065\_C3 ⊔AT065\_C4 ⊔AT065\_C5 ⊔AT065\_C6 ⊔AT065\_C7)  
 AT066 ⊒Archetype ⌈hasZone Commercial ⌈hasGPR 11.2 ⌈hasComponent.(AT066\_C1 ⊔  
 AT066\_C2 ⊔AT066\_C3 ⊔AT066\_C4 ⊔AT066\_C5)  
 AT067 ⊒Archetype ⌈hasZone Commercial ⌈hasGPR 15.0 ⌈hasComponent.(AT067\_C1 ⊔  
 AT067\_C2 ⊔AT067\_C3 ⊔AT067\_C4 ⊔AT067\_C5)  
 AT068 ⊒Archetype ⌈hasZone CommercialAndResidential ⌈hasGPR 2.8 ⌈  
 hasComponent.(AT068\_C1 ⊔AT068\_C2 ⊔AT068\_C3 ⊔AT068\_C4 ⊔AT068\_C5 ⊔AT068\_C6 ⊔  
 AT068\_C7 ⊔AT068\_C8 ⊔AT068\_C9 ⊔AT068\_C10)  
 AT069 ⊒Archetype ⌈hasZone CommercialAndResidential ⌈hasGPR 3.0 ⌈  
 hasComponent.(AT069\_C1 ⊔AT069\_C2)  
 AT070 ⊒Archetype ⌈hasZone CommercialAndResidential ⌈hasGPR 3.0 ⌈  
 hasComponent.(AT070\_C1 ⊔AT070\_C2)  
 AT071 ⊒Archetype ⌈hasZone CommercialAndResidential ⌈hasGPR 3.0 ⌈  
 hasComponent.(AT071\_C1)  
 AT072 ⊒Archetype ⌈hasZone CommercialAndResidential ⌈hasGPR 3.0 ⌈  
 hasComponent.(AT072\_C1 ⊔AT072\_C2 ⊔AT072\_C3)  
 AT073 ⊒Archetype ⌈hasZone CommercialAndResidential ⌈hasGPR 3.0 ⌈  
 hasComponent.(AT073\_C1 ⊔AT073\_C2 ⊔AT073\_C3)  
 AT074 ⊒Archetype ⌈hasZone CommercialAndResidential ⌈hasGPR 3.0 ⌈  
 hasComponent.(AT074\_C1 ⊔AT074\_C2)  
 AT075 ⊒Archetype ⌈hasZone CommercialAndResidential ⌈hasGPR 3.0 ⌈  
 hasComponent.(AT075\_C1 ⊔AT075\_C2)  
 AT076 ⊒Archetype ⌈hasZone CommercialAndResidential ⌈hasGPR 3.0 ⌈  
 hasComponent.(AT076\_C1 ⊔AT076\_C2)  
 AT077 ⊒Archetype ⌈hasZone CommercialAndResidential ⌈hasGPR 3.0 ⌈  
 hasComponent.(AT077\_C1 ⊔AT077\_C2)  
 AT078 ⊒Archetype ⌈hasZone CommercialAndResidential ⌈hasGPR 3.0 ⌈  
 hasComponent.(AT078\_C1 ⊔AT078\_C2)  
 AT079 ⊒Archetype ⌈hasZone CommercialAndResidential ⌈hasGPR 3.0 ⌈  
 hasComponent.(AT079\_C1)  
 AT080 ⊒Archetype ⌈hasZone CommercialAndResidential ⌈hasGPR 1.4 ⌈  
 hasComponent.(AT080\_C1 ⊔AT080\_C2 ⊔AT080\_C3 ⊔AT080\_C4 ⊔AT080\_C5 ⊔AT080\_C6 ⊔  
 AT080\_C7 ⊔AT080\_C8 ⊔AT080\_C9 ⊔AT080\_C10 ⊔AT080\_C11 ⊔AT080\_C12 ⊔AT080\_C13 ⊔  
 AT080\_C14 ⊔AT080\_C15 ⊔AT080\_C16 ⊔AT080\_C17 ⊔AT080\_C18 ⊔AT080\_C19 ⊔  
 AT080\_C20 ⊔AT080\_C21)  
 AT081 ⊒Archetype ⌈hasZone CommercialAndResidential ⌈hasGPR 3.0 ⌈  
 hasComponent.(AT081\_C1 ⊔AT081\_C2 ⊔AT081\_C3 ⊔AT081\_C4 ⊔AT081\_C5 ⊔AT081\_C6 ⊔  
 AT081\_C7 ⊔AT081\_C8 ⊔AT081\_C9 ⊔AT081\_C10 ⊔AT081\_C11 ⊔AT081\_C12 ⊔AT081\_C13 ⊔  
 AT081\_C14 ⊔AT081\_C15 ⊔AT081\_C16 ⊔AT081\_C17)  
 AT082 ⊒Archetype ⌈hasZone CommercialAndResidential ⌈hasGPR 3.0 ⌈  
 hasComponent.(AT082\_C1 ⊔AT082\_C2 ⊔AT082\_C3 ⊔AT082\_C4 ⊔AT082\_C5 ⊔AT082\_C6 ⊔  
 AT082\_C7 ⊔AT082\_C8 ⊔AT082\_C9 ⊔AT082\_C10 ⊔AT082\_C11 ⊔AT082\_C12 ⊔AT082\_C13 ⊔  
 AT082\_C14 ⊔AT082\_C15 ⊔AT082\_C16)  
 AT083 ⊒Archetype ⌈hasZone CommercialAndResidential ⌈hasGPR 2.2 ⌈  
 hasComponent.(AT083\_C1 ⊔AT083\_C2 ⊔AT083\_C3 ⊔AT083\_C4 ⊔AT083\_C5 ⊔AT083\_C6 ⊔  
 AT083\_C7 ⊔AT083\_C8 ⊔AT083\_C9 ⊔AT083\_C10)  
 AT084 ⊒Archetype ⌈hasZone CommercialAndResidential ⌈hasGPR 4.9 ⌈  
 hasComponent.(AT084\_C1 ⊔AT084\_C2 ⊔AT084\_C3 ⊔AT084\_C4 ⊔AT084\_C5)  
 AT085 ⊒Archetype ⌈hasZone CommercialAndResidential ⌈hasGPR 4.9 ⌈

hasComponent.(AT085\_C1 ⊔ AT085\_C2 ⊔ AT085\_C3 ⊔ AT085\_C4 ⊔ AT085\_C5 ⊔ AT085\_C6 ⊔ AT085\_C7)  
 AT086 ⊔ Archetype ⊭ hasZone CommercialAndResidential ⊭ hasGPR 4.2 ⊭ hasComponent.(AT086\_C1 ⊔ AT086\_C2 ⊔ AT086\_C3 ⊔ AT086\_C4)  
 AT087 ⊔ Archetype ⊭ hasZone CommercialAndResidential ⊭ hasGPR 4.2 ⊭ hasComponent.(AT087\_C1 ⊔ AT087\_C2)  
 AT088 ⊔ Archetype ⊭ hasZone CommercialAndResidential ⊭ hasGPR 4.2 ⊭ hasComponent.(AT088\_C1 ⊔ AT088\_C2 ⊔ AT088\_C3 ⊔ AT088\_C4)  
 AT089 ⊔ Archetype ⊭ hasZone CommercialAndResidential ⊭ hasGPR 4.2 ⊭ hasComponent.(AT089\_C1 ⊔ AT089\_C2 ⊔ AT089\_C3)  
 AT090 ⊔ Archetype ⊭ hasZone CommercialAndResidential ⊭ hasGPR 4.9 ⊭ hasComponent.(AT090\_C1 ⊔ AT090\_C2 ⊔ AT090\_C3 ⊔ AT090\_C4 ⊔ AT090\_C5 ⊔ AT090\_C6 ⊔ AT090\_C7 ⊔ AT090\_C8 ⊔ AT090\_C9 ⊔ AT090\_C10 ⊔ AT090\_C11 ⊔ AT090\_C12 ⊔ AT090\_C13 ⊔ AT090\_C14 ⊔ AT090\_C15 ⊔ AT090\_C16)  
 AT091 ⊔ Archetype ⊭ hasZone CommercialAndResidential ⊭ hasGPR 4.2 ⊭ hasComponent.(AT091\_C1 ⊔ AT091\_C2 ⊔ AT091\_C3 ⊔ AT091\_C4 ⊔ AT091\_C5 ⊔ AT091\_C6 ⊔ AT091\_C7 ⊔ AT091\_C8 ⊔ AT091\_C9 ⊔ AT091\_C10 ⊔ AT091\_C11 ⊔ AT091\_C12 ⊔ AT091\_C13 ⊔ AT091\_C14 ⊔ AT091\_C15 ⊔ AT091\_C16 ⊔ AT091\_C17 ⊔ AT091\_C18 ⊔ AT091\_C19)  
 AT092 ⊔ Archetype ⊭ hasZone CommercialAndResidential ⊭ hasGPR 5.0 ⊭ hasComponent.(AT092\_C1 ⊔ AT092\_C2 ⊔ AT092\_C3 ⊔ AT092\_C4 ⊔ AT092\_C5 ⊔ AT092\_C6 ⊔ AT092\_C7 ⊔ AT092\_C8 ⊔ AT092\_C9 ⊔ AT092\_C10 ⊔ AT092\_C11 ⊔ AT092\_C12 ⊔ AT092\_C13 ⊔ AT092\_C14 ⊔ AT092\_C15 ⊔ AT092\_C16 ⊔ AT092\_C17 ⊔ AT092\_C18 ⊔ AT092\_C19)  
 AT093 ⊔ Archetype ⊭ hasZone CommercialAndResidential ⊭ hasGPR 4.2 ⊭ hasComponent.(AT093\_C1 ⊔ AT093\_C2 ⊔ AT093\_C3 ⊔ AT093\_C4 ⊔ AT093\_C5 ⊔ AT093\_C6 ⊔ AT093\_C7 ⊔ AT093\_C8 ⊔ AT093\_C9 ⊔ AT093\_C10 ⊔ AT093\_C11 ⊔ AT093\_C12 ⊔ AT093\_C13)  
 AT094 ⊔ Archetype ⊭ hasZone CommercialAndResidential ⊭ hasGPR 2.5 ⊭ hasComponent.(AT094\_C1 ⊔ AT094\_C2 ⊔ AT094\_C3 ⊔ AT094\_C4 ⊔ AT094\_C5 ⊔ AT094\_C6 ⊔ AT094\_C7 ⊔ AT094\_C8 ⊔ AT094\_C9 ⊔ AT094\_C10 ⊔ AT094\_C11 ⊔ AT094\_C12 ⊔ AT094\_C13 ⊔ AT094\_C14 ⊔ AT094\_C15 ⊔ AT094\_C16 ⊔ AT094\_C17 ⊔ AT094\_C18 ⊔ AT094\_C19 ⊔ AT094\_C20 ⊔ AT094\_C21 ⊔ AT094\_C22 ⊔ AT094\_C23 ⊔ AT094\_C24 ⊔ AT094\_C25 ⊔ AT094\_C26 ⊔ AT094\_C27)  
 AT095 ⊔ Archetype ⊭ hasZone CommercialAndResidential ⊭ hasGPR 3.5 ⊭ hasComponent.(AT095\_C1 ⊔ AT095\_C2 ⊔ AT095\_C3 ⊔ AT095\_C4 ⊔ AT095\_C5 ⊔ AT095\_C6 ⊔ AT095\_C7 ⊔ AT095\_C8 ⊔ AT095\_C9 ⊔ AT095\_C10 ⊔ AT095\_C11 ⊔ AT095\_C12 ⊔ AT095\_C13 ⊔ AT095\_C14 ⊔ AT095\_C15 ⊔ AT095\_C16 ⊔ AT095\_C17)  
 AT096 ⊔ Archetype ⊭ hasZone CommercialAndResidential ⊭ hasGPR 3.0 ⊭ hasComponent.(AT096\_C1 ⊔ AT096\_C2 ⊔ AT096\_C3 ⊔ AT096\_C4 ⊔ AT096\_C5 ⊔ AT096\_C6 ⊔ AT096\_C7 ⊔ AT096\_C8 ⊔ AT096\_C9 ⊔ AT096\_C10 ⊔ AT096\_C11 ⊔ AT096\_C12 ⊔ AT096\_C13 ⊔ AT096\_C14 ⊔ AT096\_C15 ⊔ AT096\_C16 ⊔ AT096\_C17 ⊔ AT096\_C18 ⊔ AT096\_C19 ⊔ AT096\_C20 ⊔ AT096\_C21 ⊔ AT096\_C22 ⊔ AT096\_C23 ⊔ AT096\_C24 ⊔ AT096\_C25 ⊔ AT096\_C26 ⊔ AT096\_C27)  
 AT097 ⊔ Archetype ⊭ hasZone CommercialOrInstitution ⊭ hasGPR 2.8 ⊭ hasComponent.(AT097\_C1)  
 AT098 ⊔ Archetype ⊭ hasZone CommercialOrInstitution ⊭ hasGPR 2.8 ⊭ hasComponent.(AT098\_C1 ⊔ AT098\_C2)  
 AT099 ⊔ Archetype ⊭ hasZone CommercialOrInstitution ⊭ hasGPR 2.8 ⊭ hasComponent.(AT099\_C1 ⊔ AT099\_C2)  
 AT100 ⊔ Archetype ⊭ hasZone CommercialOrInstitution ⊭ hasGPR 2.8 ⊭ hasComponent.(AT100\_C1 ⊔ AT100\_C2)  
 AT101 ⊔ Archetype ⊭ hasZone CommercialOrInstitution ⊭ hasGPR 2.8 ⊭ hasComponent.(AT101\_C1 ⊔ AT101\_C2)



AT102  $\sqsubseteq$ Archetype  $\Gamma \forall$  hasZone CommercialOrInstitution  $\Gamma \forall$  hasGPR 2.8  $\Gamma \forall$  hasComponent.(AT102\_C1  $\sqcup$  AT102\_C2)

AT103  $\sqsubseteq$ Archetype  $\Gamma \forall$  hasZone CommercialOrInstitution  $\Gamma \forall$  hasGPR 2.8  $\Gamma \forall$  hasComponent.(AT103\_C1  $\sqcup$  AT103\_C2)

AT104  $\sqsubseteq$ Archetype  $\Gamma \forall$  hasZone HotelZone  $\Gamma \forall$  hasGPR 2.8  $\Gamma \forall$  hasComponent.(AT104\_C1  $\sqcup$  AT104\_C2  $\sqcup$  AT104\_C3  $\sqcup$  AT104\_C4  $\sqcup$  AT104\_C5  $\sqcup$  AT104\_C6)

AT105  $\sqsubseteq$ Archetype  $\Gamma \forall$  hasZone HotelZone  $\Gamma \forall$  hasGPR 3.0  $\Gamma \forall$  hasComponent.(AT105\_C1  $\sqcup$  AT105\_C2  $\sqcup$  AT105\_C3  $\sqcup$  AT105\_C4  $\sqcup$  AT105\_C5  $\sqcup$  AT105\_C6)

AT106  $\sqsubseteq$ Archetype  $\Gamma \forall$  hasZone HotelZone  $\Gamma \forall$  hasGPR 3.0  $\Gamma \forall$  hasComponent.(AT106\_C1  $\sqcup$  AT106\_C2  $\sqcup$  AT106\_C3  $\sqcup$  AT106\_C4  $\sqcup$  AT106\_C5  $\sqcup$  AT106\_C6  $\sqcup$  AT106\_C7  $\sqcup$  AT106\_C8  $\sqcup$  AT106\_C9  $\sqcup$  AT106\_C10  $\sqcup$  AT106\_C11)

AT107  $\sqsubseteq$ Archetype  $\Gamma \forall$  hasZone HotelZone  $\Gamma \forall$  hasGPR 2.8  $\Gamma \forall$  hasComponent.(AT107\_C1  $\sqcup$  AT107\_C2  $\sqcup$  AT107\_C3  $\sqcup$  AT107\_C4)

AT108  $\sqsubseteq$ Archetype  $\Gamma \forall$  hasZone HotelZone  $\Gamma \forall$  hasGPR 2.8  $\Gamma \forall$  hasComponent.(AT108\_C1  $\sqcup$  AT108\_C2  $\sqcup$  AT108\_C3)

AT109  $\sqsubseteq$ Archetype  $\Gamma \forall$  hasZone HotelZone  $\Gamma \forall$  hasGPR 3.8  $\Gamma \forall$  hasComponent.(AT109\_C1  $\sqcup$  AT109\_C2  $\sqcup$  AT109\_C3  $\sqcup$  AT109\_C4  $\sqcup$  AT109\_C5  $\sqcup$  AT109\_C6  $\sqcup$  AT109\_C7)

AT110  $\sqsubseteq$ Archetype  $\Gamma \forall$  hasZone HotelZone  $\Gamma \forall$  hasGPR 3.5  $\Gamma \forall$  hasComponent.(AT110\_C1  $\sqcup$  AT110\_C2  $\sqcup$  AT110\_C3  $\sqcup$  AT110\_C4  $\sqcup$  AT110\_C5  $\sqcup$  AT110\_C6  $\sqcup$  AT110\_C7  $\sqcup$  AT110\_C8  $\sqcup$  AT110\_C9)

AT111  $\sqsubseteq$ Archetype  $\Gamma \forall$  hasZone HotelZone  $\Gamma \forall$  hasGPR 3.0  $\Gamma \forall$  hasComponent.(AT111\_C1  $\sqcup$  AT111\_C2  $\sqcup$  AT111\_C3  $\sqcup$  AT111\_C4  $\sqcup$  AT111\_C5  $\sqcup$  AT111\_C6  $\sqcup$  AT111\_C7)

AT112  $\sqsubseteq$ Archetype  $\Gamma \forall$  hasZone HotelZone  $\Gamma \forall$  hasGPR 3.5  $\Gamma \forall$  hasComponent.(AT112\_C1  $\sqcup$  AT112\_C2  $\sqcup$  AT112\_C3  $\sqcup$  AT112\_C4  $\sqcup$  AT112\_C5  $\sqcup$  AT112\_C6  $\sqcup$  AT112\_C7  $\sqcup$  AT112\_C8  $\sqcup$  AT112\_C9  $\sqcup$  AT112\_C10  $\sqcup$  AT112\_C11  $\sqcup$  AT112\_C12  $\sqcup$  AT112\_C13  $\sqcup$  AT112\_C14  $\sqcup$  AT112\_C15  $\sqcup$  AT112\_C16  $\sqcup$  AT112\_C17  $\sqcup$  AT112\_C18  $\sqcup$  AT112\_C19  $\sqcup$  AT112\_C20)

AT113  $\sqsubseteq$ Archetype  $\Gamma \forall$  hasZone HotelZone  $\Gamma \forall$  hasGPR 5.6  $\Gamma \forall$  hasComponent.(AT113\_C1  $\sqcup$  AT113\_C2  $\sqcup$  AT113\_C3  $\sqcup$  AT113\_C4  $\sqcup$  AT113\_C5  $\sqcup$  AT113\_C6  $\sqcup$  AT113\_C7  $\sqcup$  AT113\_C8  $\sqcup$  AT113\_C9  $\sqcup$  AT113\_C10  $\sqcup$  AT113\_C11  $\sqcup$  AT113\_C12  $\sqcup$  AT113\_C13  $\sqcup$  AT113\_C14  $\sqcup$  AT113\_C15  $\sqcup$  AT113\_C16  $\sqcup$  AT113\_C17)

AT114  $\sqsubseteq$ Archetype  $\Gamma \forall$  hasZone HotelZone  $\Gamma \forall$  hasGPR 4.9  $\Gamma \forall$  hasComponent.(AT114\_C1  $\sqcup$  AT114\_C2)

AT115  $\sqsubseteq$ Archetype  $\Gamma \forall$  hasZone HotelZone  $\Gamma \forall$  hasGPR 4.2  $\Gamma \forall$  hasComponent.(AT115\_C1  $\sqcup$  AT115\_C2  $\sqcup$  AT115\_C3  $\sqcup$  AT115\_C4  $\sqcup$  AT115\_C5)

AT116  $\sqsubseteq$ Archetype  $\Gamma \forall$  hasZone HotelZone  $\Gamma \forall$  hasGPR 4.2  $\Gamma \forall$  hasComponent.(AT116\_C1  $\sqcup$  AT116\_C2  $\sqcup$  AT116\_C3  $\sqcup$  AT116\_C4)

AT117  $\sqsubseteq$ Archetype  $\Gamma \forall$  hasZone HotelZone  $\Gamma \forall$  hasGPR 4.2  $\Gamma \forall$  hasComponent.(AT117\_C1  $\sqcup$  AT117\_C2  $\sqcup$  AT117\_C3  $\sqcup$  AT117\_C4  $\sqcup$  AT117\_C5  $\sqcup$  AT117\_C6  $\sqcup$  AT117\_C7  $\sqcup$  AT117\_C8  $\sqcup$  AT117\_C9  $\sqcup$  AT117\_C10  $\sqcup$  AT117\_C11)

AT118  $\sqsubseteq$ Archetype  $\Gamma \forall$  hasZone HotelZone  $\Gamma \forall$  hasGPR 4.9  $\Gamma \forall$  hasComponent.(AT118\_C1  $\sqcup$  AT118\_C2  $\sqcup$  AT118\_C3  $\sqcup$  AT118\_C4  $\sqcup$  AT118\_C5  $\sqcup$  AT118\_C6  $\sqcup$  AT118\_C7  $\sqcup$  AT118\_C8)

AT119  $\sqsubseteq$ Archetype  $\Gamma \forall$  hasZone HotelZone  $\Gamma \forall$  hasGPR 4.9  $\Gamma \forall$  hasComponent.(AT119\_C1  $\sqcup$  AT119\_C2  $\sqcup$  AT119\_C3  $\sqcup$  AT119\_C4  $\sqcup$  AT119\_C5  $\sqcup$  AT119\_C6)

AT120  $\sqsubseteq$ Archetype  $\Gamma \forall$  hasZone HotelZone  $\Gamma \forall$  hasGPR 9.9  $\Gamma \forall$  hasComponent.(AT120\_C1  $\sqcup$  AT120\_C2  $\sqcup$  AT120\_C3  $\sqcup$  AT120\_C4  $\sqcup$  AT120\_C5  $\sqcup$  AT120\_C6  $\sqcup$  AT120\_C7  $\sqcup$  AT120\_C8  $\sqcup$  AT120\_C9  $\sqcup$  AT120\_C10  $\sqcup$  AT120\_C11  $\sqcup$  AT120\_C12  $\sqcup$  AT120\_C13  $\sqcup$  AT120\_C14  $\sqcup$  AT120\_C15  $\sqcup$  AT120\_C16  $\sqcup$  AT120\_C17  $\sqcup$  AT120\_C18  $\sqcup$  AT120\_C19  $\sqcup$  AT120\_C20  $\sqcup$  AT120\_C21  $\sqcup$  AT120\_C22)

AT121  $\sqsubseteq$ Archetype  $\Gamma \forall$  hasZone ResidentialWithCommercialAtFirstStorey  $\Gamma \forall$  hasGPR 2.8  $\Gamma \forall$  hasComponent.(AT121\_C1  $\sqcup$  AT121\_C2  $\sqcup$  AT121\_C3  $\sqcup$  AT121\_C4  $\sqcup$  AT121\_C5)

AT122  $\sqsubseteq$ Archetype  $\Gamma \forall$  hasZone ResidentialWithCommercialAtFirstStorey  $\Gamma \forall$  hasGPR 3.0  $\Gamma \forall$  hasComponent.(AT122\_C1  $\sqcup$  AT122\_C2)

AT123     $\sqsubseteq$ Archetype  $\nVdash$  hasZone ResidentialWithCommercialAtFirstStorey  $\nVdash$  hasGPR 3.0  $\nVdash$  hasComponent.(AT123\_C1  $\sqcup$  AT123\_C2)

AT124     $\sqsubseteq$ Archetype  $\nVdash$  hasZone ResidentialWithCommercialAtFirstStorey  $\nVdash$  hasGPR 3.0  $\nVdash$  hasComponent.(AT124\_C1  $\sqcup$  AT124\_C2)

AT125     $\sqsubseteq$ Archetype  $\nVdash$  hasZone ResidentialWithCommercialAtFirstStorey  $\nVdash$  hasGPR 2.8  $\nVdash$  hasComponent.(AT125\_C1  $\sqcup$  AT125\_C2  $\sqcup$  AT125\_C3  $\sqcup$  AT125\_C4)

AT126     $\sqsubseteq$ Archetype  $\nVdash$  hasZone ResidentialWithCommercialAtFirstStorey  $\nVdash$  hasGPR 3.0  $\nVdash$  hasComponent.(AT126\_C1  $\sqcup$  AT126\_C2  $\sqcup$  AT126\_C3)

AT127     $\sqsubseteq$ Archetype  $\nVdash$  hasZone ResidentialWithCommercialAtFirstStorey  $\nVdash$  hasGPR 2.8  $\nVdash$  hasComponent.(AT127\_C1  $\sqcup$  AT127\_C2  $\sqcup$  AT127\_C3  $\sqcup$  AT127\_C4)

AT128     $\sqsubseteq$ Archetype  $\nVdash$  hasZone ResidentialWithCommercialAtFirstStorey  $\nVdash$  hasGPR 3.0  $\nVdash$  hasComponent.(AT128\_C1)

AT129     $\sqsubseteq$ Archetype  $\nVdash$  hasZone ResidentialWithCommercialAtFirstStorey  $\nVdash$  hasGPR 3.0  $\nVdash$  hasComponent.(AT129\_C1  $\sqcup$  AT129\_C2)

AT130     $\sqsubseteq$ Archetype  $\nVdash$  hasZone ResidentialWithCommercialAtFirstStorey  $\nVdash$  hasGPR 2.5  $\nVdash$  hasComponent.(AT130\_C1  $\sqcup$  AT130\_C2  $\sqcup$  AT130\_C3  $\sqcup$  AT130\_C4  $\sqcup$  AT130\_C5  $\sqcup$  AT130\_C6)

AT131     $\sqsubseteq$ Archetype  $\nVdash$  hasZone ResidentialWithCommercialAtFirstStorey  $\nVdash$  hasGPR 3.8  $\nVdash$  hasComponent.(AT131\_C1  $\sqcup$  AT131\_C2  $\sqcup$  AT131\_C3)

AT132     $\sqsubseteq$ Archetype  $\nVdash$  hasZone ResidentialWithCommercialAtFirstStorey  $\nVdash$  hasGPR 3.0  $\nVdash$  hasComponent.(AT132\_C1  $\sqcup$  AT132\_C2)

AT133     $\sqsubseteq$ Archetype  $\nVdash$  hasZone ResidentialWithCommercialAtFirstStorey  $\nVdash$  hasGPR 2.8  $\nVdash$  hasComponent.(AT133\_C1  $\sqcup$  AT133\_C2  $\sqcup$  AT133\_C3  $\sqcup$  AT133\_C4)

AT134     $\sqsubseteq$ Archetype  $\nVdash$  hasZone ResidentialWithCommercialAtFirstStorey  $\nVdash$  hasGPR 3.0  $\nVdash$  hasComponent.(AT134\_C1)

AT135     $\sqsubseteq$ Archetype  $\nVdash$  hasZone ResidentialWithCommercialAtFirstStorey  $\nVdash$  hasGPR 3.0  $\nVdash$  hasComponent.(AT135\_C1  $\sqcup$  AT135\_C2  $\sqcup$  AT135\_C3)

AT136     $\sqsubseteq$ Archetype  $\nVdash$  hasZone ResidentialWithCommercialAtFirstStorey  $\nVdash$  hasGPR 2.8  $\nVdash$  hasComponent.(AT136\_C1  $\sqcup$  AT136\_C2  $\sqcup$  AT136\_C3)

AT137     $\sqsubseteq$ Archetype  $\nVdash$  hasZone ResidentialWithCommercialAtFirstStorey  $\nVdash$  hasGPR 1.4  $\nVdash$  hasComponent.(AT137\_C1  $\sqcup$  AT137\_C2  $\sqcup$  AT137\_C3  $\sqcup$  AT137\_C4)

AT138     $\sqsubseteq$ Archetype  $\nVdash$  hasZone ResidentialWithCommercialAtFirstStorey  $\nVdash$  hasGPR 3.0  $\nVdash$  hasComponent.(AT138\_C1)

AT139     $\sqsubseteq$ Archetype  $\nVdash$  hasZone ResidentialWithCommercialAtFirstStorey  $\nVdash$  hasGPR 2.8  $\nVdash$  hasComponent.(AT139\_C1  $\sqcup$  AT139\_C2)

AT140     $\sqsubseteq$ Archetype  $\nVdash$  hasZone ResidentialWithCommercialAtFirstStorey  $\nVdash$  hasGPR 2.8  $\nVdash$  hasComponent.(AT140\_C1  $\sqcup$  AT140\_C2  $\sqcup$  AT140\_C3  $\sqcup$  AT140\_C4  $\sqcup$  AT140\_C5)

AT141     $\sqsubseteq$ Archetype  $\nVdash$  hasZone ResidentialWithCommercialAtFirstStorey  $\nVdash$  hasGPR 3.0  $\nVdash$  hasComponent.(AT141\_C1  $\sqcup$  AT141\_C2  $\sqcup$  AT141\_C3  $\sqcup$  AT141\_C4  $\sqcup$  AT141\_C5  $\sqcup$  AT141\_C6  $\sqcup$  AT141\_C7)

AT142     $\sqsubseteq$ Archetype  $\nVdash$  hasZone ResidentialWithCommercialAtFirstStorey  $\nVdash$  hasGPR 3.0  $\nVdash$  hasComponent.(AT142\_C1  $\sqcup$  AT142\_C2  $\sqcup$  AT142\_C3  $\sqcup$  AT142\_C4  $\sqcup$  AT142\_C5  $\sqcup$  AT142\_C6  $\sqcup$  AT142\_C7  $\sqcup$  AT142\_C8)

AT143     $\sqsubseteq$ Archetype  $\nVdash$  hasZone ResidentialWithCommercialAtFirstStorey  $\nVdash$  hasGPR 2.8  $\nVdash$  hasComponent.(AT143\_C1  $\sqcup$  AT143\_C2  $\sqcup$  AT143\_C3  $\sqcup$  AT143\_C4  $\sqcup$  AT143\_C5  $\sqcup$  AT143\_C6  $\sqcup$  AT143\_C7  $\sqcup$  AT143\_C8)

AT144     $\sqsubseteq$ Archetype  $\nVdash$  hasZone ResidentialWithCommercialAtFirstStorey  $\nVdash$  hasGPR 2.8  $\nVdash$  hasComponent.(AT144\_C1  $\sqcup$  AT144\_C2  $\sqcup$  AT144\_C3  $\sqcup$  AT144\_C4  $\sqcup$  AT144\_C5  $\sqcup$  AT144\_C6)

AT145     $\sqsubseteq$ Archetype  $\nVdash$  hasZone ResidentialWithCommercialAtFirstStorey  $\nVdash$  hasGPR 3.0  $\nVdash$  hasComponent.(AT145\_C1  $\sqcup$  AT145\_C2  $\sqcup$  AT145\_C3  $\sqcup$  AT145\_C4  $\sqcup$  AT145\_C5  $\sqcup$  AT145\_C6  $\sqcup$  AT145\_C7  $\sqcup$  AT145\_C8  $\sqcup$  AT145\_C9)

AT146     $\sqsubseteq$ Archetype  $\nVdash$  hasZone ResidentialWithCommercialAtFirstStorey  $\nVdash$  hasGPR 2.8  $\nVdash$

hasComponent.(AT146\_C1 ⊔AT146\_C2 ⊔AT146\_C3 ⊔AT146\_C4 ⊔AT146\_C5 ⊔AT146\_C6)  
 AT147 ⊔Archetype ⊔hasZone ResidentialWithCommercialAtFirstStorey ⊔hasGPR 3.0 ⊔hasComponent.(AT147\_C1 ⊔AT147\_C2 ⊔AT147\_C3 ⊔AT147\_C4)  
 AT148 ⊔Archetype ⊔hasZone ResidentialWithCommercialAtFirstStorey ⊔hasGPR 2.8 ⊔hasComponent.(AT148\_C1 ⊔AT148\_C2 ⊔AT148\_C3 ⊔AT148\_C4 ⊔AT148\_C5)  
 AT149 ⊔Archetype ⊔hasZone ResidentialWithCommercialAtFirstStorey ⊔hasGPR 2.8 ⊔hasComponent.(AT149\_C1 ⊔AT149\_C2 ⊔AT149\_C3 ⊔AT149\_C4 ⊔AT149\_C5 ⊔AT149\_C6 ⊔AT149\_C7)  
 AT150 ⊔Archetype ⊔hasZone ResidentialWithCommercialAtFirstStorey ⊔hasGPR 2.8 ⊔hasComponent.(AT150\_C1 ⊔AT150\_C2 ⊔AT150\_C3 ⊔AT150\_C4 ⊔AT150\_C5 ⊔AT150\_C6)  
 AT151 ⊔Archetype ⊔hasZone ResidentialWithCommercialAtFirstStorey ⊔hasGPR 2.8 ⊔hasComponent.(AT151\_C1 ⊔AT151\_C2 ⊔AT151\_C3 ⊔AT151\_C4 ⊔AT151\_C5 ⊔AT151\_C6 ⊔AT151\_C7 ⊔AT151\_C8)  
 AT152 ⊔Archetype ⊔hasZone ResidentialWithCommercialAtFirstStorey ⊔hasGPR 2.8 ⊔hasComponent.(AT152\_C1 ⊔AT152\_C2 ⊔AT152\_C3 ⊔AT152\_C4 ⊔AT152\_C5 ⊔AT152\_C6)  
 AT153 ⊔Archetype ⊔hasZone ResidentialWithCommercialAtFirstStorey ⊔hasGPR 2.8 ⊔hasComponent.(AT153\_C1 ⊔AT153\_C2 ⊔AT153\_C3 ⊔AT153\_C4 ⊔AT153\_C5 ⊔AT153\_C6 ⊔AT153\_C7 ⊔AT153\_C8 ⊔AT153\_C9 ⊔AT153\_C10)  
 AT154 ⊔Archetype ⊔hasZone ResidentialWithCommercialAtFirstStorey ⊔hasGPR 2.8 ⊔hasComponent.(AT154\_C1 ⊔AT154\_C2 ⊔AT154\_C3 ⊔AT154\_C4 ⊔AT154\_C5 ⊔AT154\_C6)  
 AT155 ⊔Archetype ⊔hasZone ResidentialWithCommercialAtFirstStorey ⊔hasGPR 3.0 ⊔hasComponent.(AT155\_C1 ⊔AT155\_C2 ⊔AT155\_C3 ⊔AT155\_C4)  
 AT156 ⊔Archetype ⊔hasZone ResidentialWithCommercialAtFirstStorey ⊔hasGPR 2.8 ⊔hasComponent.(AT156\_C1 ⊔AT156\_C2 ⊔AT156\_C3 ⊔AT156\_C4 ⊔AT156\_C5 ⊔AT156\_C6 ⊔AT156\_C7 ⊔AT156\_C8 ⊔AT156\_C9 ⊔AT156\_C10 ⊔AT156\_C11 ⊔AT156\_C12 ⊔AT156\_C13 ⊔AT156\_C14 ⊔AT156\_C15 ⊔AT156\_C16 ⊔AT156\_C17)  
 AT157 ⊔Archetype ⊔hasZone ResidentialWithCommercialAtFirstStorey ⊔hasGPR 11.2 ⊔hasComponent.(AT157\_C1 ⊔AT157\_C2 ⊔AT157\_C3 ⊔AT157\_C4 ⊔AT157\_C5 ⊔AT157\_C6 ⊔AT157\_C7 ⊔AT157\_C8 ⊔AT157\_C9 ⊔AT157\_C10 ⊔AT157\_C11)  
 AT158 ⊔Archetype ⊔hasZone White ⊔hasGPR 4.9 ⊔hasComponent.(AT158\_C1 ⊔AT158\_C2 ⊔AT158\_C3)  
 AT159 ⊔Archetype ⊔hasZone White ⊔hasGPR 4.2 ⊔hasComponent.(AT159\_C1 ⊔AT159\_C2 ⊔AT159\_C3 ⊔AT159\_C4 ⊔AT159\_C5 ⊔AT159\_C6 ⊔AT159\_C7)  
 AT160 ⊔Archetype ⊔hasZone White ⊔hasGPR 4.2 ⊔hasComponent.(AT160\_C1 ⊔AT160\_C2 ⊔AT160\_C3 ⊔AT160\_C4 ⊔AT160\_C5 ⊔AT160\_C6 ⊔AT160\_C7 ⊔AT160\_C8 ⊔AT160\_C9 ⊔AT160\_C10 ⊔AT160\_C11 ⊔AT160\_C12)  
 AT161 ⊔Archetype ⊔hasZone White ⊔hasGPR 4.9 ⊔hasComponent.(AT161\_C1 ⊔AT161\_C2 ⊔AT161\_C3 ⊔AT161\_C4 ⊔AT161\_C5 ⊔AT161\_C6 ⊔AT161\_C7 ⊔AT161\_C8 ⊔AT161\_C9 ⊔AT161\_C10 ⊔AT161\_C11 ⊔AT161\_C12 ⊔AT161\_C13 ⊔AT161\_C14 ⊔AT161\_C15 ⊔AT161\_C16 ⊔AT161\_C17 ⊔AT161\_C18 ⊔AT161\_C19 ⊔AT161\_C20 ⊔AT161\_C21 ⊔AT161\_C22 ⊔AT161\_C23)  
 AT162 ⊔Archetype ⊔hasZone White ⊔hasGPR 10.5 ⊔hasComponent.(AT162\_C1 ⊔AT162\_C2 ⊔AT162\_C3 ⊔AT162\_C4 ⊔AT162\_C5 ⊔AT162\_C6 ⊔AT162\_C7 ⊔AT162\_C8 ⊔AT162\_C9 ⊔AT162\_C10 ⊔AT162\_C11 ⊔AT162\_C12 ⊔AT162\_C13 ⊔AT162\_C14 ⊔AT162\_C15 ⊔AT162\_C16 ⊔AT162\_C17 ⊔AT162\_C18 ⊔AT162\_C19 ⊔AT162\_C20 ⊔AT162\_C21 ⊔AT162\_C22)  
 AT163 ⊔Archetype ⊔hasZone White ⊔hasGPR 13.0 ⊔hasComponent.(AT163\_C1 ⊔AT163\_C2 ⊔AT163\_C3 ⊔AT163\_C4 ⊔AT163\_C5 ⊔AT163\_C6 ⊔AT163\_C7 ⊔AT163\_C8 ⊔AT163\_C9 ⊔AT163\_C10 ⊔AT163\_C11)

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Table S7: Description Logic terms and axioms representing the archetype components and their constituent programmes and ratios.

Term	Axiom
AT001_C1	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(Gym) $\sqcap$ hasRatio(0.018))
AT001_C2	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(ElectronicsStore) $\sqcap$ hasRatio(0.036))
AT001_C3	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(Restaurant) $\sqcap$ hasRatio(0.054))
AT001_C4	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(HealthService) $\sqcap$ hasRatio(0.006))
AT001_C5	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(BeautyService) $\sqcap$ hasRatio(0.042))
AT001_C6	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(School) $\sqcap$ hasRatio(0.045))
AT001_C7	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(Bar/Cafe) $\sqcap$ hasRatio(0.014))
AT001_C8	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(FurnitureStore) $\sqcap$ hasRatio(0.012))
AT001_C9	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(ArtGallery) $\sqcap$ hasRatio(0.011))
AT001_C10	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(Unknown) $\sqcap$ hasRatio(0.762))
AT002_C1	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(Gym) $\sqcap$ hasRatio(0.008))
AT002_C2	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(ClothingStore/ShoeStore) $\sqcap$ hasRatio(0.004))
AT002_C3	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(CarRepair/CarWash) $\sqcap$ hasRatio(0.029))
AT002_C4	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(ElectronicsStore) $\sqcap$ hasRatio(0.155))
AT002_C5	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(Restaurant) $\sqcap$ hasRatio(0.058))
AT002_C6	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(BeautyService) $\sqcap$ hasRatio(0.009))
AT002_C7	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(School) $\sqcap$ hasRatio(0.026))
AT002_C8	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(Bar/Cafe) $\sqcap$ hasRatio(0.02))
AT002_C9	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(DepartmentStore) $\sqcap$ hasRatio(0.179))
AT002_C10	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(FurnitureStore) $\sqcap$ hasRatio(0.016))
AT002_C11	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(HardwareStore) $\sqcap$ hasRatio(0.01))
AT002_C12	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(HomeGoodsStore) $\sqcap$ hasRatio(0.034))
AT002_C13	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(Florist) $\sqcap$ hasRatio(0.052))
AT002_C14	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(JewelryStore) $\sqcap$ hasRatio(0.008))
AT002_C15	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(LiquorStore) $\sqcap$ hasRatio(0.011))
AT002_C16	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(Museum) $\sqcap$ hasRatio(0.007))
AT002_C17	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(Unknown) $\sqcap$ hasRatio(0.374))
AT003_C1	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(Gym) $\sqcap$ hasRatio(0.029))
AT003_C2	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(ElectronicsStore) $\sqcap$ hasRatio(0.029))
AT003_C3	$\sqsubseteq$ ArchetypeComponent $\sqcap$ hasComponent.Programme(CarDealer/CarRental) $\sqcap$

hasRatio(0.015))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Restaurant) ⊧  
 AT003\_C4 hasRatio(0.022))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(BeautyService) ⊧  
 AT003\_C5 hasRatio(0.017))  
 AT003\_C6 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Bar/Cafe) ⊧ hasRatio(0.022))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(ConvenienceStore) ⊧  
 AT003\_C7 hasRatio(0.028))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(FurnitureStore) ⊧  
 AT003\_C8 hasRatio(0.02))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(HardwareStore) ⊧  
 AT003\_C9 hasRatio(0.036))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(HomeGoodsStore) ⊧  
 AT003\_C10 hasRatio(0.025))  
 AT003\_C11 ⊆ArchetypeComponent ⊧ hasComponent.Programme(BookStore) ⊧ hasRatio(0.052))  
 AT003\_C12 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Unknown) ⊧ hasRatio(0.705))  
 AT004\_C1 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Gym) ⊧ hasRatio(0.1))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(CarRepair/CarWash) ⊧  
 AT004\_C2 hasRatio(0.031))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(PetStore/VeterinaryCare) ⊧  
 AT004\_C3 hasRatio(0.049))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Restaurant) ⊧  
 AT004\_C4 hasRatio(0.304))  
 AT004\_C5 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Bar/Cafe) ⊧ hasRatio(0.052))  
 AT004\_C6 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Laundry) ⊧ hasRatio(0.099))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(HomeGoodsStore) ⊧  
 AT004\_C7 hasRatio(0.088))  
 AT004\_C8 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Unknown) ⊧ hasRatio(0.278))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(ClothingStore/ShoeStore) ⊧  
 AT005\_C1 hasRatio(0.009))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Restaurant) ⊧  
 AT005\_C2 hasRatio(0.079))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(HealthService) ⊧  
 AT005\_C3 hasRatio(0.005))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(BeautyService) ⊧  
 AT005\_C4 hasRatio(0.035))  
 AT005\_C5 ⊆ArchetypeComponent ⊧ hasComponent.Programme(School) ⊧ hasRatio(0.012))  
 AT005\_C6 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Bar/Cafe) ⊧ hasRatio(0.027))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(ConvenienceStore) ⊧  
 AT005\_C7 hasRatio(0.007))  
 AT005\_C8 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Locksmith) ⊧ hasRatio(0.024))  
 AT005\_C9 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Pharmacy) ⊧ hasRatio(0.063))  
 AT005\_C10 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Unknown) ⊧ hasRatio(0.739))  
 AT006\_C1 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Gym) ⊧ hasRatio(0.013))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(CarRepair/CarWash) ⊧  
 AT006\_C2 hasRatio(0.008))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(ElectronicsStore) ⊧  
 AT006\_C3 hasRatio(0.026))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Restaurant) ⊧  
 AT006\_C4 hasRatio(0.019))  
 AT006\_C5 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Unknown) ⊧ hasRatio(0.934))

AT007\_C1  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(ClothingStore/ShoeStore)  $\not\models$ hasRatio(0.004))  
 AT007\_C2  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(CarRepair/CarWash)  $\not\models$ hasRatio(0.004))  
 AT007\_C3  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(ElectronicsStore)  $\not\models$ hasRatio(0.039))  
 AT007\_C4  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Restaurant)  $\not\models$ hasRatio(0.005))  
 AT007\_C5  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(School)  $\not\models$ hasRatio(0.011))  
 AT007\_C6  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Bar/Cafe)  $\not\models$ hasRatio(0.002))  
 AT007\_C7  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Unknown)  $\not\models$ hasRatio(0.937))  
 AT008\_C1  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Gym)  $\not\models$ hasRatio(0.006))  
 AT008\_C2  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(CarRepair/CarWash)  $\not\models$ hasRatio(0.004))  
 AT008\_C3  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(ElectronicsStore)  $\not\models$ hasRatio(0.013))  
 AT008\_C4  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Restaurant)  $\not\models$ hasRatio(0.043))  
 AT008\_C5  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Supermarket)  $\not\models$ hasRatio(0.069))  
 AT008\_C6  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(School)  $\not\models$ hasRatio(0.011))  
 AT008\_C7  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Bar/Cafe)  $\not\models$ hasRatio(0.016))  
 AT008\_C8  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(ConvenienceStore)  $\not\models$ hasRatio(0.006))  
 AT008\_C9  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Locksmith)  $\not\models$ hasRatio(0.021))  
 AT008\_C10  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Florist)  $\not\models$ hasRatio(0.011))  
 AT008\_C11  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Unknown)  $\not\models$ hasRatio(0.8))  
 AT009\_C1  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(ElectronicsStore)  $\not\models$ hasRatio(0.023))  
 AT009\_C2  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Restaurant)  $\not\models$ hasRatio(0.009))  
 AT009\_C3  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Unknown)  $\not\models$ hasRatio(0.968))  
 AT010\_C1  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(ElectronicsStore)  $\not\models$ hasRatio(0.048))  
 AT010\_C2  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(CarDealer/CarRental)  $\not\models$ hasRatio(0.025))  
 AT010\_C3  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(JewelryStore)  $\not\models$ hasRatio(0.048))  
 AT010\_C4  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Unknown)  $\not\models$ hasRatio(0.879))  
 AT011\_C1  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Gym)  $\not\models$ hasRatio(0.004))  
 AT011\_C2  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(ClothingStore/ShoeStore)  $\not\models$ hasRatio(0.001))  
 AT011\_C3  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(ElectronicsStore)  $\not\models$ hasRatio(0.043))  
 AT011\_C4  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Restaurant)  $\not\models$ hasRatio(0.023))  
 AT011\_C5  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(School)  $\not\models$ hasRatio(0.021))  
 AT011\_C6  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Bar/Cafe)  $\not\models$ hasRatio(0.001))  
 AT011\_C7  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(DepartmentStore)  $\not\models$ hasRatio(0.049))  
 AT011\_C8  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(FurnitureStore)  $\not\models$

hasRatio(0.001))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(HomeGoodsStore) ⊧  
 AT011\_C9 hasRatio(0.002))  
 AT011\_C10 ⊆ArchetypeComponent ⊧ hasComponent.Programme(BookStore) ⊧ hasRatio(0.004))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(BicycleStore) ⊧  
 AT011\_C11 hasRatio(0.002))  
 AT011\_C12 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Unknown) ⊧ hasRatio(0.848))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(ElectronicsStore) ⊧  
 AT012\_C1 hasRatio(0.013))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Restaurant) ⊧  
 AT012\_C2 hasRatio(0.015))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(BeautyService) ⊧  
 AT012\_C3 hasRatio(0.008))  
 AT012\_C4 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Unknown) ⊧ hasRatio(0.964))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Restaurant) ⊧  
 AT013\_C1 hasRatio(0.046))  
 AT013\_C2 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Pharmacy) ⊧ hasRatio(0.086))  
 AT013\_C3 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Unknown) ⊧ hasRatio(0.867))  
 AT014\_C1 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Gym) ⊧ hasRatio(0.003))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(CarRepair/CarWash) ⊧  
 AT014\_C2 hasRatio(0.002))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(ElectronicsStore) ⊧  
 AT014\_C3 hasRatio(0.005))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Restaurant) ⊧  
 AT014\_C4 hasRatio(0.046))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(BeautyService) ⊧  
 AT014\_C5 hasRatio(0.009))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Supermarket) ⊧  
 AT014\_C6 hasRatio(0.028))  
 AT014\_C7 ⊆ArchetypeComponent ⊧ hasComponent.Programme(School) ⊧ hasRatio(0.038))  
 AT014\_C8 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Bar/Cafe) ⊧ hasRatio(0.01))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(ConvenienceStore) ⊧  
 AT014\_C9 hasRatio(0.002))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(FurnitureStore) ⊧  
 AT014\_C10 hasRatio(0.002))  
 AT014\_C11 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Pharmacy) ⊧ hasRatio(0.011))  
 AT014\_C12 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Florist) ⊧ hasRatio(0.004))  
 AT014\_C13 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Lodging) ⊧ hasRatio(0.026))  
 AT014\_C14 ⊆ArchetypeComponent ⊧ hasComponent.Programme(NightClub) ⊧ hasRatio(0.003))  
 AT014\_C15 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Museum) ⊧ hasRatio(0.005))  
 AT014\_C16 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Unknown) ⊧ hasRatio(0.806))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Bank/PostOffice) ⊧  
 AT015\_C1 hasRatio(0.022))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(ClothingStore/ShoeStore) ⊧  
 AT015\_C2 hasRatio(0.005))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(ElectronicsStore) ⊧  
 AT015\_C3 hasRatio(0.024))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(PetStore/VeterinaryCare) ⊧  
 AT015\_C4 hasRatio(0.004))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Restaurant) ⊧  
 AT015\_C5 hasRatio(0.093))

AT015\_C6  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(HealthService)  $\nVdash$ hasRatio(0.003))  
 AT015\_C7  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(BeautyService)  $\nVdash$ hasRatio(0.024))  
 AT015\_C8  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(School)  $\nVdash$ hasRatio(0.013))  
 AT015\_C9  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Bar/Cafe)  $\nVdash$ hasRatio(0.004))  
 AT015\_C10  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(DepartmentStore)  $\nVdash$ hasRatio(0.046))  
 AT015\_C11  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(ConvenienceStore)  $\nVdash$ hasRatio(0.004))  
 AT015\_C12  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(HomeGoodsStore)  $\nVdash$ hasRatio(0.014))  
 AT015\_C13  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Locksmith)  $\nVdash$ hasRatio(0.013))  
 AT015\_C14  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(BookStore)  $\nVdash$ hasRatio(0.007))  
 AT015\_C15  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Pharmacy)  $\nVdash$ hasRatio(0.034))  
 AT015\_C16  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Florist)  $\nVdash$ hasRatio(0.013))  
 AT015\_C17  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Unknown)  $\nVdash$ hasRatio(0.677))  
 AT016\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Supermarket)  $\nVdash$ hasRatio(1.0))  
 AT017\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(ClothingStore/ShoeStore)  $\nVdash$ hasRatio(0.043))  
 AT017\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(ElectronicsStore)  $\nVdash$ hasRatio(0.075))  
 AT017\_C3  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Restaurant)  $\nVdash$ hasRatio(0.099))  
 AT017\_C4  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Bar/Cafe)  $\nVdash$ hasRatio(0.019))  
 AT017\_C5  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(DepartmentStore)  $\nVdash$ hasRatio(0.431))  
 AT017\_C6  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(FurnitureStore)  $\nVdash$ hasRatio(0.013))  
 AT017\_C7  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Unknown)  $\nVdash$ hasRatio(0.321))  
 AT018\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(ArtGallery)  $\nVdash$ hasRatio(0.626))  
 AT018\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Unknown)  $\nVdash$ hasRatio(0.374))  
 AT019\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Gym)  $\nVdash$ hasRatio(0.142))  
 AT019\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Restaurant)  $\nVdash$ hasRatio(0.215))  
 AT019\_C3  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(BeautyService)  $\nVdash$ hasRatio(0.169))  
 AT019\_C4  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(School)  $\nVdash$ hasRatio(0.475))  
 AT020\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(HomeGoodsStore)  $\nVdash$ hasRatio(1.0))  
 AT021\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(ClothingStore/ShoeStore)  $\nVdash$ hasRatio(0.319))  
 AT021\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(CarDealer/CarRental)  $\nVdash$ hasRatio(0.118))  
 AT021\_C3  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Restaurant)  $\nVdash$ hasRatio(0.252))  
 AT021\_C4  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Unknown)  $\nVdash$ hasRatio(0.312))  
 AT022\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Florist)  $\nVdash$ hasRatio(1.0))  
 AT023\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Gym)  $\nVdash$ hasRatio(0.021))  
 AT023\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(ClothingStore/ShoeStore)  $\nVdash$



hasRatio(0.012))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(BeautyService) ⊧  
 AT023\_C3 hasRatio(0.074))  
 AT023\_C4 ⊆ArchetypeComponent ⊧ hasComponent.Programme(School) ⊧ hasRatio(0.035))  
 AT023\_C5 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Bar/Cafe) ⊧ hasRatio(0.011))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(ConvenienceStore) ⊧  
 AT023\_C6 hasRatio(0.02))  
 AT023\_C7 ⊆ArchetypeComponent ⊧ hasComponent.Programme(BookStore) ⊧ hasRatio(0.037))  
 AT023\_C8 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Florist) ⊧ hasRatio(0.07))  
 AT023\_C9 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Embassy) ⊧ hasRatio(0.02))  
 AT023\_C10 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Unknown) ⊧ hasRatio(0.701))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(FurnitureStore) ⊧  
 AT024\_C1 hasRatio(0.021))  
 AT024\_C2 ⊆ArchetypeComponent ⊧ hasComponent.Programme(BookStore) ⊧ hasRatio(0.055))  
 AT024\_C3 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Museum) ⊧ hasRatio(0.029))  
 AT024\_C4 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Unknown) ⊧ hasRatio(0.895))  
 AT025\_C1 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Gym) ⊧ hasRatio(0.224))  
 AT025\_C2 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Restaurant) ⊧ hasRatio(0.17))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(MovieRental) ⊧  
 AT025\_C3 hasRatio(0.406))  
 AT025\_C4 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Unknown) ⊧ hasRatio(0.201))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Restaurant) ⊧  
 AT026\_C1 hasRatio(0.066))  
 AT026\_C2 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Bar/Cafe) ⊧ hasRatio(0.045))  
 AT026\_C3 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Lodging) ⊧ hasRatio(0.889))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(ClothingStore/ShoeStore) ⊧  
 AT027\_C1 hasRatio(0.025))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(CarRepair/CarWash) ⊧  
 AT027\_C2 hasRatio(0.027))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(ElectronicsStore) ⊧  
 AT027\_C3 hasRatio(0.115))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(CarDealer/CarRental) ⊧  
 AT027\_C4 hasRatio(0.015))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(PetStore/VeterinaryCare) ⊧  
 AT027\_C5 hasRatio(0.014))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Restaurant) ⊧  
 AT027\_C6 hasRatio(0.141))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(HealthService) ⊧  
 AT027\_C7 hasRatio(0.019))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(BeautyService) ⊧  
 AT027\_C8 hasRatio(0.034))  
 AT027\_C9 ⊆ArchetypeComponent ⊧ hasComponent.Programme(School) ⊧ hasRatio(0.119))  
 AT027\_C10 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Bar/Cafe) ⊧ hasRatio(0.022))  
 AT027\_C11 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Laundry) ⊧ hasRatio(0.028))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(ConvenienceStore) ⊧  
 AT027\_C12 hasRatio(0.014))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(MovieRental) ⊧  
 AT027\_C13 hasRatio(0.052))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(FurnitureStore) ⊧  
 AT027\_C14 hasRatio(0.02))

AT027\_C15  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(HomeGoodsStore)  $\not\models$ hasRatio(0.025))  
 AT027\_C16  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Locksmith)  $\not\models$ hasRatio(0.047))  
 AT027\_C17  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(BookStore)  $\not\models$ hasRatio(0.026))  
 AT027\_C18  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Pharmacy)  $\not\models$ hasRatio(0.06))  
 AT027\_C19  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(JewelryStore)  $\not\models$ hasRatio(0.015))  
 AT027\_C20  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(ArtGallery)  $\not\models$ hasRatio(0.018))  
 AT027\_C21  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(MovieTheater)  $\not\models$ hasRatio(0.165))  
 AT028\_C1  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(ElectronicsStore)  $\not\models$ hasRatio(0.051))  
 AT028\_C2  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(PetStore/VeterinaryCare)  $\not\models$ hasRatio(0.025))  
 AT028\_C3  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(HealthService)  $\not\models$ hasRatio(0.171))  
 AT028\_C4  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(BeautyService)  $\not\models$ hasRatio(0.091))  
 AT028\_C5  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(School)  $\not\models$ hasRatio(0.043))  
 AT028\_C6  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Bar/Cafe)  $\not\models$ hasRatio(0.013))  
 AT028\_C7  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Unknown)  $\not\models$ hasRatio(0.606))  
 AT029\_C1  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(ElectronicsStore)  $\not\models$ hasRatio(0.5))  
 AT029\_C2  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(PetStore/VeterinaryCare)  $\not\models$ hasRatio(0.03))  
 AT029\_C3  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(HealthService)  $\not\models$ hasRatio(0.021))  
 AT029\_C4  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(BeautyService)  $\not\models$ hasRatio(0.074))  
 AT029\_C5  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(School)  $\not\models$ hasRatio(0.207))  
 AT029\_C6  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(HomeGoodsStore)  $\not\models$ hasRatio(0.027))  
 AT029\_C7  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(BookStore)  $\not\models$ hasRatio(0.112))  
 AT029\_C8  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(BicycleStore)  $\not\models$ hasRatio(0.029))  
 AT030\_C1  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Gym)  $\not\models$ hasRatio(0.157))  
 AT030\_C2  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Restaurant)  $\not\models$ hasRatio(0.357))  
 AT030\_C3  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Bar/Cafe)  $\not\models$ hasRatio(0.081))  
 AT030\_C4  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Unknown)  $\not\models$ hasRatio(0.405))  
 AT031\_C1  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(BicycleStore)  $\not\models$ hasRatio(0.744))  
 AT031\_C2  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Unknown)  $\not\models$ hasRatio(0.256))  
 AT032\_C1  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(HomeGoodsStore)  $\not\models$ hasRatio(0.659))  
 AT032\_C2  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Unknown)  $\not\models$ hasRatio(0.341))  
 AT033\_C1  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(FurnitureStore)  $\not\models$ hasRatio(0.507))  
 AT033\_C2  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Unknown)  $\not\models$ hasRatio(0.493))  
 AT034\_C1  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(LiquorStore)  $\not\models$ hasRatio(0.876))

AT034\_C2  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Unknown)  $\not\models$ hasRatio(0.124))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(ConvenienceStore)  $\not\models$   
 AT035\_C1 hasRatio(0.701))  
 AT035\_C2  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Unknown)  $\not\models$ hasRatio(0.299))  
 AT036\_C1  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(NightClub)  $\not\models$ hasRatio(0.839))  
 AT036\_C2  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Unknown)  $\not\models$ hasRatio(0.161))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Bank/PostOffice)  $\not\models$   
 AT037\_C1 hasRatio(1.0))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Supermarket)  $\not\models$   
 AT038\_C1 hasRatio(0.955))  
 AT038\_C2  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Bar/Cafe)  $\not\models$ hasRatio(0.045))  
 AT039\_C1  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Gym)  $\not\models$ hasRatio(0.042))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Restaurant)  $\not\models$   
 AT039\_C2 hasRatio(0.191))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(HealthService)  $\not\models$   
 AT039\_C3 hasRatio(0.028))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(BeautyService)  $\not\models$   
 AT039\_C4 hasRatio(0.2))  
 AT039\_C5  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(NightClub)  $\not\models$ hasRatio(0.049))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(MovieTheater)  $\not\models$   
 AT039\_C6 hasRatio(0.486))  
 AT039\_C7  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Unknown)  $\not\models$ hasRatio(0.003))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(ElectronicsStore)  $\not\models$   
 AT040\_C1 hasRatio(1.0))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(HealthService)  $\not\models$   
 AT041\_C1 hasRatio(0.27))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(MovieRental)  $\not\models$   
 AT041\_C2 hasRatio(0.73))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(BeautyService)  $\not\models$   
 AT042\_C1 hasRatio(0.219))  
 AT042\_C2  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Pharmacy)  $\not\models$ hasRatio(0.781))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Restaurant)  $\not\models$   
 AT043\_C1 hasRatio(0.375))  
 AT043\_C2  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(ArtGallery)  $\not\models$ hasRatio(0.625))  
 AT044\_C1  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Gym)  $\not\models$ hasRatio(0.03))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Restaurant)  $\not\models$   
 AT044\_C2 hasRatio(0.023))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(HealthService)  $\not\models$   
 AT044\_C3 hasRatio(0.02))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(BeautyService)  $\not\models$   
 AT044\_C4 hasRatio(0.214))  
 AT044\_C5  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Bar/Cafe)  $\not\models$ hasRatio(0.016))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(DepartmentStore)  $\not\models$   
 AT044\_C6 hasRatio(0.697))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(CarDealer/CarRental)  $\not\models$   
 AT045\_C1 hasRatio(0.588))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(JewelryStore)  $\not\models$   
 AT045\_C2 hasRatio(0.284))  
 AT045\_C3  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Unknown)  $\not\models$ hasRatio(0.129))  
 AT046\_C1  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Bar/Cafe)  $\not\models$ hasRatio(0.172))  
 AT046\_C2  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(FurnitureStore)  $\not\models$

hasRatio(0.228))  
 AT046\_C3  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(BookStore)  $\Gamma \nabla$  hasRatio(0.599))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Restaurant)  $\Gamma \nabla$   
 AT047\_C1 hasRatio(0.024))  
 AT047\_C2  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Lodging)  $\Gamma \nabla$  hasRatio(0.976))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Restaurant)  $\Gamma \nabla$   
 AT048\_C1 hasRatio(0.014))  
 AT048\_C2  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Lodging)  $\Gamma \nabla$  hasRatio(0.381))  
 AT048\_C3  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Library)  $\Gamma \nabla$  hasRatio(0.022))  
 AT048\_C4  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Unknown)  $\Gamma \nabla$  hasRatio(0.584))  
 AT049\_C1  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Locksmith)  $\Gamma \nabla$  hasRatio(1.0))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Bank/PostOffice)  $\Gamma \nabla$   
 AT050\_C1 hasRatio(0.011))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(ClothingStore/ShoeStore)  $\Gamma \nabla$   
 AT050\_C2 hasRatio(0.09))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(ElectronicsStore)  $\Gamma \nabla$   
 AT050\_C3 hasRatio(0.068))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(PetStore/VeterinaryCare)  $\Gamma \nabla$   
 AT050\_C4 hasRatio(0.003))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Restaurant)  $\Gamma \nabla$   
 AT050\_C5 hasRatio(0.174))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(HealthService)  $\Gamma \nabla$   
 AT050\_C6 hasRatio(0.002))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(BeautyService)  $\Gamma \nabla$   
 AT050\_C7 hasRatio(0.164))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Supermarket)  $\Gamma \nabla$   
 AT050\_C8 hasRatio(0.067))  
 AT050\_C9  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Bar/Cafe)  $\Gamma \nabla$  hasRatio(0.022))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(DepartmentStore)  $\Gamma \nabla$   
 AT050\_C10 hasRatio(0.177))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(MovieRental)  $\Gamma \nabla$   
 AT050\_C11 hasRatio(0.006))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(FurnitureStore)  $\Gamma \nabla$   
 AT050\_C12 hasRatio(0.021))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(HomeGoodsStore)  $\Gamma \nabla$   
 AT050\_C13 hasRatio(0.029))  
 AT050\_C14  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Locksmith)  $\Gamma \nabla$  hasRatio(0.01))  
 AT050\_C15  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(BookStore)  $\Gamma \nabla$  hasRatio(0.017))  
 AT050\_C16  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Pharmacy)  $\Gamma \nabla$  hasRatio(0.039))  
 AT050\_C17  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Florist)  $\Gamma \nabla$  hasRatio(0.01))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(JewelryStore)  $\Gamma \nabla$   
 AT050\_C18 hasRatio(0.031))  
 AT050\_C19  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(ArtGallery)  $\Gamma \nabla$  hasRatio(0.004))  
 AT050\_C20  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(NightClub)  $\Gamma \nabla$  hasRatio(0.018))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(MovieTheater)  $\Gamma \nabla$   
 AT050\_C21 hasRatio(0.035))  
 AT051\_C1  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Gym)  $\Gamma \nabla$  hasRatio(0.005))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Bank/PostOffice)  $\Gamma \nabla$   
 AT051\_C2 hasRatio(0.023))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(ClothingStore/ShoeStore)  $\Gamma \nabla$   
 AT051\_C3 hasRatio(0.036))

AT051\_C4  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(CarRepair/CarWash)  $\neg \forall$  hasRatio(0.015))  
 AT051\_C5  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(ElectronicsStore)  $\neg \forall$  hasRatio(0.233))  
 AT051\_C6  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(CarDealer/CarRental)  $\neg \forall$  hasRatio(0.013))  
 AT051\_C7  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(PetStore/VeterinaryCare)  $\neg \forall$  hasRatio(0.002))  
 AT051\_C8  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Restaurant)  $\neg \forall$  hasRatio(0.037))  
 AT051\_C9  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(HealthService)  $\neg \forall$  hasRatio(0.002))  
 AT051\_C10  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(BeautyService)  $\neg \forall$  hasRatio(0.092))  
 AT051\_C11  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Supermarket)  $\neg \forall$  hasRatio(0.027))  
 AT051\_C12  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(School)  $\neg \forall$  hasRatio(0.049))  
 AT051\_C13  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Bar/Cafe)  $\neg \forall$  hasRatio(0.006))  
 AT051\_C14  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(DepartmentStore)  $\neg \forall$  hasRatio(0.214))  
 AT051\_C15  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Laundry)  $\neg \forall$  hasRatio(0.015))  
 AT051\_C16  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(ConvenienceStore)  $\neg \forall$  hasRatio(0.006))  
 AT051\_C17  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(MovieRental)  $\neg \forall$  hasRatio(0.004))  
 AT051\_C18  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(FurnitureStore)  $\neg \forall$  hasRatio(0.014))  
 AT051\_C19  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(HardwareStore)  $\neg \forall$  hasRatio(0.022))  
 AT051\_C20  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(HomeGoodsStore)  $\neg \forall$  hasRatio(0.032))  
 AT051\_C21  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Locksmith)  $\neg \forall$  hasRatio(0.004))  
 AT051\_C22  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(BookStore)  $\neg \forall$  hasRatio(0.035))  
 AT051\_C23  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Pharmacy)  $\neg \forall$  hasRatio(0.026))  
 AT051\_C24  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(BicycleStore)  $\neg \forall$  hasRatio(0.002))  
 AT051\_C25  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Florist)  $\neg \forall$  hasRatio(0.019))  
 AT051\_C26  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(JewelryStore)  $\neg \forall$  hasRatio(0.015))  
 AT051\_C27  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Lodging)  $\neg \forall$  hasRatio(0.025))  
 AT051\_C28  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(ArtGallery)  $\neg \forall$  hasRatio(0.011))  
 AT051\_C29  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(LiquorStore)  $\neg \forall$  hasRatio(0.011))  
 AT051\_C30  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(NightClub)  $\neg \forall$  hasRatio(0.001))  
 AT051\_C31  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Embassy)  $\neg \forall$  hasRatio(0.001))  
 AT052\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Gym)  $\neg \forall$  hasRatio(0.008))  
 AT052\_C2  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(ClothingStore/ShoeStore)  $\neg \forall$  hasRatio(0.049))  
 AT052\_C3  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(CarRepair/CarWash)  $\neg \forall$  hasRatio(0.005))  
 AT052\_C4  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(ElectronicsStore)  $\neg \forall$

hasRatio(0.047))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(PetStore/VeterinaryCare) ⊧  
 AT052\_C5 hasRatio(0.008))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Restaurant) ⊧  
 AT052\_C6 hasRatio(0.118))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(BeautyService) ⊧  
 AT052\_C7 hasRatio(0.176))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Supermarket) ⊧  
 AT052\_C8 hasRatio(0.086))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(School) ⊧ hasRatio(0.078))  
 AT052\_C9 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Bar/Cafe) ⊧ hasRatio(0.012))  
 AT052\_C10 ⊆ArchetypeComponent ⊧ hasComponent.Programme(DepartmentStore) ⊧  
 AT052\_C11 hasRatio(0.271))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(ConvenienceStore) ⊧  
 AT052\_C12 hasRatio(0.008))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(FurnitureStore) ⊧  
 AT052\_C13 hasRatio(0.016))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(HardwareStore) ⊧  
 AT052\_C14 hasRatio(0.01))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(HomeGoodsStore) ⊧  
 AT052\_C15 hasRatio(0.007))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Locksmith) ⊧ hasRatio(0.026))  
 AT052\_C16 ⊆ArchetypeComponent ⊧ hasComponent.Programme(BookStore) ⊧ hasRatio(0.028))  
 AT052\_C17 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Pharmacy) ⊧ hasRatio(0.033))  
 AT052\_C18 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Florist) ⊧ hasRatio(0.013))  
 AT052\_C19 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Gym) ⊧ hasRatio(0.005))  
 AT053\_C1 ⊆ArchetypeComponent ⊧ hasComponent.Programme(ClothingStore/ShoeStore) ⊧  
 AT053\_C2 hasRatio(0.026))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(ElectronicsStore) ⊧  
 AT053\_C3 hasRatio(0.041))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(CarDealer/CarRental) ⊧  
 AT053\_C4 hasRatio(0.011))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Restaurant) ⊧  
 AT053\_C5 hasRatio(0.099))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(HealthService) ⊧  
 AT053\_C6 hasRatio(0.017))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(BeautyService) ⊧  
 AT053\_C7 hasRatio(0.412))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Supermarket) ⊧  
 AT053\_C8 hasRatio(0.055))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(School) ⊧ hasRatio(0.034))  
 AT053\_C9 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Bar/Cafe) ⊧ hasRatio(0.031))  
 AT053\_C10 ⊆ArchetypeComponent ⊧ hasComponent.Programme(DepartmentStore) ⊧  
 AT053\_C11 hasRatio(0.116))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(ConvenienceStore) ⊧  
 AT053\_C12 hasRatio(0.005))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(MovieRental) ⊧  
 AT053\_C13 hasRatio(0.018))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(FurnitureStore) ⊧  
 AT053\_C14 hasRatio(0.003))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(HomeGoodsStore) ⊧  
 AT053\_C15

hasRatio(0.013))  
 AT053\_C16  $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Pharmacy)  $\neg \forall$  hasRatio(0.021))  
 AT053\_C17  $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Florist)  $\neg \forall$  hasRatio(0.017))  
 $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(JewelryStore)  $\neg \forall$   
 AT053\_C18 hasRatio(0.01))  
 AT053\_C19  $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(ArtGallery)  $\neg \forall$  hasRatio(0.013))  
 AT053\_C20  $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(NightClub)  $\neg \forall$  hasRatio(0.047))  
 AT053\_C21  $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Museum)  $\neg \forall$  hasRatio(0.005))  
 AT054\_C1  $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Gym)  $\neg \forall$  hasRatio(0.009))  
 $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Bank/PostOffice)  $\neg \forall$   
 AT054\_C2 hasRatio(0.008))  
 $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(ClothingStore/ShoeStore)  $\neg \forall$   
 AT054\_C3 hasRatio(0.055))  
 $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(ElectronicsStore)  $\neg \forall$   
 AT054\_C4 hasRatio(0.044))  
 $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Restaurant)  $\neg \forall$   
 AT054\_C5 hasRatio(0.119))  
 $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(HealthService)  $\neg \forall$   
 AT054\_C6 hasRatio(0.012))  
 $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(BeautyService)  $\neg \forall$   
 AT054\_C7 hasRatio(0.093))  
 $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Supermarket)  $\neg \forall$   
 AT054\_C8 hasRatio(0.096))  
 AT054\_C9  $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Bar/Cafe)  $\neg \forall$  hasRatio(0.032))  
 $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(DepartmentStore)  $\neg \forall$   
 AT054\_C10 hasRatio(0.101))  
 $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(ConvenienceStore)  $\neg \forall$   
 AT054\_C11 hasRatio(0.004))  
 $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(MovieRental)  $\neg \forall$   
 AT054\_C12 hasRatio(0.008))  
 $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(HomeGoodsStore)  $\neg \forall$   
 AT054\_C13 hasRatio(0.004))  
 AT054\_C14  $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Pharmacy)  $\neg \forall$  hasRatio(0.055))  
 AT054\_C15  $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Florist)  $\neg \forall$  hasRatio(0.007))  
 $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(JewelryStore)  $\neg \forall$   
 AT054\_C16 hasRatio(0.022))  
 AT054\_C17  $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(ArtGallery)  $\neg \forall$  hasRatio(0.006))  
 AT054\_C18  $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Unknown)  $\neg \forall$  hasRatio(0.325))  
 $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Bank/PostOffice)  $\neg \forall$   
 AT055\_C1 hasRatio(0.021))  
 $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(ClothingStore/ShoeStore)  $\neg \forall$   
 AT055\_C2 hasRatio(0.077))  
 $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(ElectronicsStore)  $\neg \forall$   
 AT055\_C3 hasRatio(0.057))  
 $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(PetStore/VeterinaryCare)  $\neg \forall$   
 AT055\_C4 hasRatio(0.005))  
 $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Restaurant)  $\neg \forall$   
 AT055\_C5 hasRatio(0.195))  
 $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(BeautyService)  $\neg \forall$   
 AT055\_C6 hasRatio(0.113))  
 AT055\_C7  $\sqsubseteq$  ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Supermarket)  $\neg \forall$

hasRatio(0.123))  
 AT055\_C8  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(School)  $\nVdash$  hasRatio(0.019))  
 AT055\_C9  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Bar/Cafe)  $\nVdash$  hasRatio(0.023))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(DepartmentStore)  $\nVdash$   
 AT055\_C10 hasRatio(0.13))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(ConvenienceStore)  $\nVdash$   
 AT055\_C11 hasRatio(0.006))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(MovieRental)  $\nVdash$   
 AT055\_C12 hasRatio(0.02))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(FurnitureStore)  $\nVdash$   
 AT055\_C13 hasRatio(0.008))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(HomeGoodsStore)  $\nVdash$   
 AT055\_C14 hasRatio(0.02))  
 AT055\_C15  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(BookStore)  $\nVdash$  hasRatio(0.01))  
 AT055\_C16  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Pharmacy)  $\nVdash$  hasRatio(0.071))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(JewelryStore)  $\nVdash$   
 AT055\_C17 hasRatio(0.023))  
 AT055\_C18  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(ArtGallery)  $\nVdash$  hasRatio(0.007))  
 AT055\_C19  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Library)  $\nVdash$  hasRatio(0.007))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(MovieTheater)  $\nVdash$   
 AT055\_C20 hasRatio(0.065))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(ClothingStore/ShoeStore)  $\nVdash$   
 AT056\_C1 hasRatio(0.028))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(ElectronicsStore)  $\nVdash$   
 AT056\_C2 hasRatio(0.097))  
 AT056\_C3  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Restaurant)  $\nVdash$  hasRatio(0.22))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(BeautyService)  $\nVdash$   
 AT056\_C4 hasRatio(0.287))  
 AT056\_C5  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Bar/Cafe)  $\nVdash$  hasRatio(0.05))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(FurnitureStore)  $\nVdash$   
 AT056\_C6 hasRatio(0.011))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(HomeGoodsStore)  $\nVdash$   
 AT056\_C7 hasRatio(0.028))  
 AT056\_C8  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Pharmacy)  $\nVdash$  hasRatio(0.068))  
 AT056\_C9  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Florist)  $\nVdash$  hasRatio(0.137))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(JewelryStore)  $\nVdash$   
 AT056\_C10 hasRatio(0.017))  
 AT056\_C11  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(ArtGallery)  $\nVdash$  hasRatio(0.02))  
 AT056\_C12  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(NightClub)  $\nVdash$  hasRatio(0.038))  
 AT057\_C1  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Gym)  $\nVdash$  hasRatio(0.007))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Bank/PostOffice)  $\nVdash$   
 AT057\_C2 hasRatio(0.038))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(ClothingStore/ShoeStore)  $\nVdash$   
 AT057\_C3 hasRatio(0.016))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(CarRepair/CarWash)  $\nVdash$   
 AT057\_C4 hasRatio(0.017))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(ElectronicsStore)  $\nVdash$   
 AT057\_C5 hasRatio(0.288))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(CarDealer/CarRental)  $\nVdash$   
 AT057\_C6 hasRatio(0.014))  
 AT057\_C7  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Restaurant)  $\nVdash$



hasRatio(0.026))  
 ⊆ArchetypeComponent ⊭ hasComponent.Programme(BeautyService) ⊭  
 AT057\_C8 hasRatio(0.089))  
 AT057\_C9 ⊆ArchetypeComponent ⊭ hasComponent.Programme(School) ⊭ hasRatio(0.068))  
 AT057\_C10 ⊆ArchetypeComponent ⊭ hasComponent.Programme(Bar/Cafe) ⊭ hasRatio(0.004))  
 ⊆ArchetypeComponent ⊭ hasComponent.Programme(DepartmentStore) ⊭  
 AT057\_C11 hasRatio(0.157))  
 ⊆ArchetypeComponent ⊭ hasComponent.Programme(FurnitureStore) ⊭  
 AT057\_C12 hasRatio(0.028))  
 ⊆ArchetypeComponent ⊭ hasComponent.Programme(HardwareStore) ⊭  
 AT057\_C13 hasRatio(0.017))  
 ⊆ArchetypeComponent ⊭ hasComponent.Programme(HomeGoodsStore) ⊭  
 AT057\_C14 hasRatio(0.024))  
 AT057\_C15 ⊆ArchetypeComponent ⊭ hasComponent.Programme(BookStore) ⊭ hasRatio(0.037))  
 AT057\_C16 ⊆ArchetypeComponent ⊭ hasComponent.Programme(Pharmacy) ⊭ hasRatio(0.029))  
 AT057\_C17 ⊆ArchetypeComponent ⊭ hasComponent.Programme(Florist) ⊭ hasRatio(0.023))  
 ⊆ArchetypeComponent ⊭ hasComponent.Programme(JewelryStore) ⊭  
 AT057\_C18 hasRatio(0.021))  
 AT057\_C19 ⊆ArchetypeComponent ⊭ hasComponent.Programme(Lodging) ⊭ hasRatio(0.07))  
 AT057\_C20 ⊆ArchetypeComponent ⊭ hasComponent.Programme(ArtGallery) ⊭ hasRatio(0.009))  
 AT057\_C21 ⊆ArchetypeComponent ⊭ hasComponent.Programme(LiquorStore) ⊭ hasRatio(0.02))  
 AT058\_C1 ⊆ArchetypeComponent ⊭ hasComponent.Programme(Gym) ⊭ hasRatio(0.009))  
 ⊆ArchetypeComponent ⊭ hasComponent.Programme(Bank/PostOffice) ⊭  
 AT058\_C2 hasRatio(0.027))  
 ⊆ArchetypeComponent ⊭ hasComponent.Programme(ClothingStore/ShoeStore) ⊭  
 AT058\_C3 hasRatio(0.042))  
 ⊆ArchetypeComponent ⊭ hasComponent.Programme(ElectronicsStore) ⊭  
 AT058\_C4 hasRatio(0.012))  
 ⊆ArchetypeComponent ⊭ hasComponent.Programme(Restaurant) ⊭  
 AT058\_C5 hasRatio(0.084))  
 ⊆ArchetypeComponent ⊭ hasComponent.Programme(HealthService) ⊭  
 AT058\_C6 hasRatio(0.016))  
 ⊆ArchetypeComponent ⊭ hasComponent.Programme(BeautyService) ⊭  
 AT058\_C7 hasRatio(0.066))  
 AT058\_C8 ⊆ArchetypeComponent ⊭ hasComponent.Programme(Bar/Cafe) ⊭ hasRatio(0.017))  
 ⊆ArchetypeComponent ⊭ hasComponent.Programme(DepartmentStore) ⊭  
 AT058\_C9 hasRatio(0.068))  
 AT058\_C10 ⊆ArchetypeComponent ⊭ hasComponent.Programme(Laundry) ⊭ hasRatio(0.011))  
 ⊆ArchetypeComponent ⊭ hasComponent.Programme(FurnitureStore) ⊭  
 AT058\_C11 hasRatio(0.002))  
 ⊆ArchetypeComponent ⊭ hasComponent.Programme(HomeGoodsStore) ⊭  
 AT058\_C12 hasRatio(0.003))  
 AT058\_C13 ⊆ArchetypeComponent ⊭ hasComponent.Programme(Locksmith) ⊭ hasRatio(0.01))  
 AT058\_C14 ⊆ArchetypeComponent ⊭ hasComponent.Programme(BookStore) ⊭ hasRatio(0.011))  
 AT058\_C15 ⊆ArchetypeComponent ⊭ hasComponent.Programme(Florist) ⊭ hasRatio(0.01))  
 ⊆ArchetypeComponent ⊭ hasComponent.Programme(JewelryStore) ⊭  
 AT058\_C16 hasRatio(0.021))  
 ⊆ArchetypeComponent ⊭ hasComponent.Programme(LiquorStore) ⊭  
 AT058\_C17 hasRatio(0.004))  
 AT058\_C18 ⊆ArchetypeComponent ⊭ hasComponent.Programme(Unknown) ⊭ hasRatio(0.589))

AT059\_C1  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Bank/PostOffice)  $\not\models$ hasRatio(0.021)  
 AT059\_C2  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(ClothingStore/ShoeStore)  $\not\models$ hasRatio(0.026)  
 AT059\_C3  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(CarRepair/CarWash)  $\not\models$ hasRatio(0.007)  
 AT059\_C4  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(ElectronicsStore)  $\not\models$ hasRatio(0.092)  
 AT059\_C5  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(CarDealer/CarRental)  $\not\models$ hasRatio(0.012)  
 AT059\_C6  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(PetStore/VeterinaryCare)  $\not\models$ hasRatio(0.011)  
 AT059\_C7  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Restaurant)  $\not\models$ hasRatio(0.034)  
 AT059\_C8  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(HealthService)  $\not\models$ hasRatio(0.015)  
 AT059\_C9  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(BeautyService)  $\not\models$ hasRatio(0.108)  
 AT059\_C10  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Supermarket)  $\not\models$ hasRatio(0.125)  
 AT059\_C11  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(School)  $\not\models$ hasRatio(0.019)  
 AT059\_C12  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Bar/Cafe)  $\not\models$ hasRatio(0.018)  
 AT059\_C13  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(DepartmentStore)  $\not\models$ hasRatio(0.132)  
 AT059\_C14  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(FurnitureStore)  $\not\models$ hasRatio(0.008)  
 AT059\_C15  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(HardwareStore)  $\not\models$ hasRatio(0.014)  
 AT059\_C16  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(HomeGoodsStore)  $\not\models$ hasRatio(0.04)  
 AT059\_C17  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(BookStore)  $\not\models$ hasRatio(0.082)  
 AT059\_C18  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Pharmacy)  $\not\models$ hasRatio(0.048)  
 AT059\_C19  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(JewelryStore)  $\not\models$ hasRatio(0.012)  
 AT059\_C20  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Lodging)  $\not\models$ hasRatio(0.117)  
 AT059\_C21  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(LiquorStore)  $\not\models$ hasRatio(0.033)  
 AT059\_C22  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(NightClub)  $\not\models$ hasRatio(0.026)  
 AT060\_C1  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Gym)  $\not\models$ hasRatio(0.032)  
 AT060\_C2  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Bank/PostOffice)  $\not\models$ hasRatio(0.03)  
 AT060\_C3  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(ClothingStore/ShoeStore)  $\not\models$ hasRatio(0.056)  
 AT060\_C4  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(ElectronicsStore)  $\not\models$ hasRatio(0.131)  
 AT060\_C5  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Restaurant)  $\not\models$ hasRatio(0.098)  
 AT060\_C6  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(HealthService)  $\not\models$ hasRatio(0.011)  
 AT060\_C7  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(BeautyService)  $\not\models$ hasRatio(0.346)

AT060\_C8  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Bar/Cafe)  $\nVdash$  hasRatio(0.075))  
 AT060\_C9  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Laundry)  $\nVdash$  hasRatio(0.032))  
 AT060\_C10  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(ConvenienceStore)  $\nVdash$  hasRatio(0.016))  
 AT060\_C11  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(HomeGoodsStore)  $\nVdash$  hasRatio(0.014))  
 AT060\_C12  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Florist)  $\nVdash$  hasRatio(0.082))  
 AT060\_C13  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(LiquorStore)  $\nVdash$  hasRatio(0.023))  
 AT060\_C14  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(NightClub)  $\nVdash$  hasRatio(0.038))  
 AT060\_C15  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Embassy)  $\nVdash$  hasRatio(0.015))  
 AT061\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Gym)  $\nVdash$  hasRatio(0.027))  
 AT061\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Bank/PostOffice)  $\nVdash$  hasRatio(0.025))  
 AT061\_C3  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(ClothingStore/ShoeStore)  $\nVdash$  hasRatio(0.047))  
 AT061\_C4  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(CarRepair/CarWash)  $\nVdash$  hasRatio(0.025))  
 AT061\_C5  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(ElectronicsStore)  $\nVdash$  hasRatio(0.495))  
 AT061\_C6  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(PetStore/VeterinaryCare)  $\nVdash$  hasRatio(0.013))  
 AT061\_C7  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Restaurant)  $\nVdash$  hasRatio(0.01))  
 AT061\_C8  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(HealthService)  $\nVdash$  hasRatio(0.018))  
 AT061\_C9  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(BeautyService)  $\nVdash$  hasRatio(0.049))  
 AT061\_C10  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(School)  $\nVdash$  hasRatio(0.046))  
 AT061\_C11  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Laundry)  $\nVdash$  hasRatio(0.054))  
 AT061\_C12  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(HardwareStore)  $\nVdash$  hasRatio(0.017))  
 AT061\_C13  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(HomeGoodsStore)  $\nVdash$  hasRatio(0.024))  
 AT061\_C14  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(BookStore)  $\nVdash$  hasRatio(0.049))  
 AT061\_C15  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(BicycleStore)  $\nVdash$  hasRatio(0.026))  
 AT061\_C16  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Florist)  $\nVdash$  hasRatio(0.023))  
 AT061\_C17  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(JewelryStore)  $\nVdash$  hasRatio(0.014))  
 AT061\_C18  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(ArtGallery)  $\nVdash$  hasRatio(0.017))  
 AT061\_C19  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(LiquorStore)  $\nVdash$  hasRatio(0.02))  
 AT062\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Bank/PostOffice)  $\nVdash$  hasRatio(0.044))  
 AT062\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(ElectronicsStore)  $\nVdash$  hasRatio(0.024))  
 AT062\_C3  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Restaurant)  $\nVdash$  hasRatio(0.018))  
 AT062\_C4  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Bar/Cafe)  $\nVdash$  hasRatio(0.006))  
 AT062\_C5  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(LiquorStore)  $\nVdash$  hasRatio(0.034))  
 AT062\_C6  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.874))

AT063\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(LiquorStore)  $\neg \forall$  hasRatio(0.861))  
 AT063\_C2  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Unknown)  $\neg \forall$  hasRatio(0.139))  
 AT064\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Bank/PostOffice)  $\neg \forall$  hasRatio(0.135))  
 AT064\_C2  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(ClothingStore/ShoeStore)  $\neg \forall$  hasRatio(0.007))  
 AT064\_C3  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(ElectronicsStore)  $\neg \forall$  hasRatio(0.049))  
 AT064\_C4  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(CarDealer/CarRental)  $\neg \forall$  hasRatio(0.009))  
 AT064\_C5  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Restaurant)  $\neg \forall$  hasRatio(0.027))  
 AT064\_C6  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(HealthService)  $\neg \forall$  hasRatio(0.003))  
 AT064\_C7  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(BeautyService)  $\neg \forall$  hasRatio(0.019))  
 AT064\_C8  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(School)  $\neg \forall$  hasRatio(0.013))  
 AT064\_C9  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(BookStore)  $\neg \forall$  hasRatio(0.007))  
 AT064\_C10  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(JewelryStore)  $\neg \forall$  hasRatio(0.004))  
 AT064\_C11  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Lodging)  $\neg \forall$  hasRatio(0.083))  
 AT064\_C12  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Embassy)  $\neg \forall$  hasRatio(0.008))  
 AT064\_C13  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(MovieTheater)  $\neg \forall$  hasRatio(0.047))  
 AT064\_C14  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Unknown)  $\neg \forall$  hasRatio(0.589))  
 AT065\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Gym)  $\neg \forall$  hasRatio(0.03))  
 AT065\_C2  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Restaurant)  $\neg \forall$  hasRatio(0.022))  
 AT065\_C3  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(HealthService)  $\neg \forall$  hasRatio(0.06))  
 AT065\_C4  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(BeautyService)  $\neg \forall$  hasRatio(0.106))  
 AT065\_C5  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Pharmacy)  $\neg \forall$  hasRatio(0.125))  
 AT065\_C6  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(LiquorStore)  $\neg \forall$  hasRatio(0.043))  
 AT065\_C7  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Unknown)  $\neg \forall$  hasRatio(0.614))  
 AT066\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(HealthService)  $\neg \forall$  hasRatio(0.097))  
 AT066\_C2  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(BeautyService)  $\neg \forall$  hasRatio(0.086))  
 AT066\_C3  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(School)  $\neg \forall$  hasRatio(0.122))  
 AT066\_C4  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(FurnitureStore)  $\neg \forall$  hasRatio(0.05))  
 AT066\_C5  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Unknown)  $\neg \forall$  hasRatio(0.645))  
 AT067\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Bank/PostOffice)  $\neg \forall$  hasRatio(0.13))  
 AT067\_C2  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(CarDealer/CarRental)  $\neg \forall$  hasRatio(0.074))  
 AT067\_C3  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(HealthService)  $\neg \forall$  hasRatio(0.186))

AT067\_C4  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(BeautyService)  $\neg \forall$  hasRatio(0.33))  
 AT067\_C5  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Unknown)  $\neg \forall$  hasRatio(0.281))  
 AT068\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Gym)  $\neg \forall$  hasRatio(0.011))  
 AT068\_C2  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Restaurant)  $\neg \forall$  hasRatio(0.143))  
 AT068\_C3  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(HealthService)  $\neg \forall$  hasRatio(0.007))  
 AT068\_C4  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(BeautyService)  $\neg \forall$  hasRatio(0.079))  
 AT068\_C5  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Bar/Cafe)  $\neg \forall$  hasRatio(0.023))  
 AT068\_C6  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Laundry)  $\neg \forall$  hasRatio(0.022))  
 AT068\_C7  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(ConvenienceStore)  $\neg \forall$  hasRatio(0.011))  
 AT068\_C8  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(HomeGoodsStore)  $\neg \forall$  hasRatio(0.019))  
 AT068\_C9  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Pharmacy)  $\neg \forall$  hasRatio(0.047))  
 AT068\_C10  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Unknown)  $\neg \forall$  hasRatio(0.636))  
 AT069\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(BeautyService)  $\neg \forall$  hasRatio(0.803))  
 AT069\_C2  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Unknown)  $\neg \forall$  hasRatio(0.197))  
 AT070\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(BicycleStore)  $\neg \forall$  hasRatio(0.638))  
 AT070\_C2  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Unknown)  $\neg \forall$  hasRatio(0.362))  
 AT071\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Supermarket)  $\neg \forall$  hasRatio(1.0))  
 AT072\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Gym)  $\neg \forall$  hasRatio(0.252))  
 AT072\_C2  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(LiquorStore)  $\neg \forall$  hasRatio(0.365))  
 AT072\_C3  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Unknown)  $\neg \forall$  hasRatio(0.383))  
 AT073\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Restaurant)  $\neg \forall$  hasRatio(0.428))  
 AT073\_C2  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(HealthService)  $\neg \forall$  hasRatio(0.379))  
 AT073\_C3  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Unknown)  $\neg \forall$  hasRatio(0.193))  
 AT074\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(HomeGoodsStore)  $\neg \forall$  hasRatio(0.629))  
 AT074\_C2  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Unknown)  $\neg \forall$  hasRatio(0.371))  
 AT075\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(HardwareStore)  $\neg \forall$  hasRatio(0.859))  
 AT075\_C2  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Unknown)  $\neg \forall$  hasRatio(0.141))  
 AT076\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(JewelryStore)  $\neg \forall$  hasRatio(0.816))  
 AT076\_C2  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Unknown)  $\neg \forall$  hasRatio(0.184))  
 AT077\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(FurnitureStore)  $\neg \forall$  hasRatio(0.451))  
 AT077\_C2  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Unknown)  $\neg \forall$  hasRatio(0.549))  
 AT078\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(CarRepair/CarWash)  $\neg \forall$  hasRatio(0.516))  
 AT078\_C2  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(NightClub)  $\neg \forall$  hasRatio(0.484))

AT079\_C1  $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(Lodging)  $\Gamma \forall$  hasRatio(1.0))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(CarRepair/CarWash)  $\Gamma \forall$   
 AT080\_C1 hasRatio(0.004))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(ElectronicsStore)  $\Gamma \forall$   
 AT080\_C2 hasRatio(0.04))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(PetStore/VeterinaryCare)  $\Gamma \forall$   
 AT080\_C3 hasRatio(0.026))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(Restaurant)  $\Gamma \forall$   
 AT080\_C4 hasRatio(0.065))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(HealthService)  $\Gamma \forall$   
 AT080\_C5 hasRatio(0.018))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(BeautyService)  $\Gamma \forall$   
 AT080\_C6 hasRatio(0.133))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(Supermarket)  $\Gamma \forall$   
 AT080\_C7 hasRatio(0.072))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(School)  $\Gamma \forall$  hasRatio(0.066))  
 AT080\_C8  $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(Bar/Cafe)  $\Gamma \forall$  hasRatio(0.02))  
 AT080\_C9  $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(DepartmentStore)  $\Gamma \forall$   
 AT080\_C10 hasRatio(0.076))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(Laundry)  $\Gamma \forall$  hasRatio(0.013))  
 AT080\_C11  $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(ConvenienceStore)  $\Gamma \forall$   
 AT080\_C12 hasRatio(0.013))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(MovieRental)  $\Gamma \forall$   
 AT080\_C13 hasRatio(0.012))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(HardwareStore)  $\Gamma \forall$   
 AT080\_C14 hasRatio(0.017))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(HomeGoodsStore)  $\Gamma \forall$   
 AT080\_C15 hasRatio(0.011))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(Pharmacy)  $\Gamma \forall$  hasRatio(0.028))  
 AT080\_C16  $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(BicycleStore)  $\Gamma \forall$   
 AT080\_C17 hasRatio(0.006))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(Florist)  $\Gamma \forall$  hasRatio(0.022))  
 AT080\_C18  $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(JewelryStore)  $\Gamma \forall$   
 AT080\_C19 hasRatio(0.007))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(Lodging)  $\Gamma \forall$  hasRatio(0.068))  
 AT080\_C20  $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(Unknown)  $\Gamma \forall$  hasRatio(0.283))  
 AT080\_C21  $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(Gym)  $\Gamma \forall$  hasRatio(0.017))  
 AT081\_C1  $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(ClothingStore/ShoeStore)  $\Gamma \forall$   
 AT081\_C2 hasRatio(0.02))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(ElectronicsStore)  $\Gamma \forall$   
 AT081\_C3 hasRatio(0.106))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(CarDealer/CarRental)  $\Gamma \forall$   
 AT081\_C4 hasRatio(0.019))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(PetStore/VeterinaryCare)  $\Gamma \forall$   
 AT081\_C5 hasRatio(0.017))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(Restaurant)  $\Gamma \forall$   
 AT081\_C6 hasRatio(0.079))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(HealthService)  $\Gamma \forall$   
 AT081\_C7 hasRatio(0.047))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(BeautyService)  $\Gamma \forall$   
 AT081\_C8 hasRatio(0.228))

AT081\_C9  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(School)  $\neg \forall$  hasRatio(0.146))  
 AT081\_C10  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Bar/Cafe)  $\neg \forall$  hasRatio(0.045))  
 AT081\_C11  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Laundry)  $\neg \forall$  hasRatio(0.069))  
 AT081\_C12  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(MovieRental)  $\neg \forall$   
 hasRatio(0.032))  
 AT081\_C13  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(FurnitureStore)  $\neg \forall$   
 hasRatio(0.024))  
 AT081\_C14  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(HardwareStore)  $\neg \forall$   
 hasRatio(0.022))  
 AT081\_C15  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Florist)  $\neg \forall$  hasRatio(0.089))  
 AT081\_C16  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(JewelryStore)  $\neg \forall$   
 hasRatio(0.018))  
 AT081\_C17  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(ArtGallery)  $\neg \forall$  hasRatio(0.022))  
 AT082\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Gym)  $\neg \forall$  hasRatio(0.025))  
 AT082\_C2  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(ClothingStore/ShoeStore)  $\neg \forall$   
 hasRatio(0.022))  
 AT082\_C3  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(ElectronicsStore)  $\neg \forall$   
 hasRatio(0.025))  
 AT082\_C4  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(CarDealer/CarRental)  $\neg \forall$   
 hasRatio(0.013))  
 AT082\_C5  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(PetStore/VeterinaryCare)  $\neg \forall$   
 hasRatio(0.012))  
 AT082\_C6  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Restaurant)  $\neg \forall$   
 hasRatio(0.085))  
 AT082\_C7  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(HealthService)  $\neg \forall$   
 hasRatio(0.034))  
 AT082\_C8  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(BeautyService)  $\neg \forall$   
 hasRatio(0.164))  
 AT082\_C9  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(School)  $\neg \forall$  hasRatio(0.084))  
 AT082\_C10  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Bar/Cafe)  $\neg \forall$  hasRatio(0.058))  
 AT082\_C11  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(ConvenienceStore)  $\neg \forall$   
 hasRatio(0.012))  
 AT082\_C12  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(BicycleStore)  $\neg \forall$   
 hasRatio(0.012))  
 AT082\_C13  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Florist)  $\neg \forall$  hasRatio(0.021))  
 AT082\_C14  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Lodging)  $\neg \forall$  hasRatio(0.129))  
 AT082\_C15  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(NightClub)  $\neg \forall$  hasRatio(0.015))  
 AT082\_C16  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(MovieTheater)  $\neg \forall$   
 hasRatio(0.289))  
 AT083\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(ClothingStore/ShoeStore)  $\neg \forall$   
 hasRatio(0.034))  
 AT083\_C2  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Restaurant)  $\neg \forall$   
 hasRatio(0.067))  
 AT083\_C3  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(HealthService)  $\neg \forall$   
 hasRatio(0.06))  
 AT083\_C4  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(BeautyService)  $\neg \forall$   
 hasRatio(0.176))  
 AT083\_C5  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Supermarket)  $\neg \forall$   
 hasRatio(0.325))  
 AT083\_C6  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Bar/Cafe)  $\neg \forall$  hasRatio(0.015))  
 AT083\_C7  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(HomeGoodsStore)  $\neg \forall$

hasRatio(0.026))  
 AT083\_C8  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Locksmith)  $\nVdash$  hasRatio(0.194))  
 AT083\_C9  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(BookStore)  $\nVdash$  hasRatio(0.053))  
 AT083\_C10  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Florist)  $\nVdash$  hasRatio(0.05))  
 AT084\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Gym)  $\nVdash$  hasRatio(0.038))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(HealthService)  $\nVdash$   
 AT084\_C2 hasRatio(0.026))  
 AT084\_C3  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(School)  $\nVdash$  hasRatio(0.127))  
 AT084\_C4  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Lodging)  $\nVdash$  hasRatio(0.195))  
 AT084\_C5  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.614))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(ClothingStore/ShoeStore)  $\nVdash$   
 AT085\_C1 hasRatio(0.088))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(ElectronicsStore)  $\nVdash$   
 AT085\_C2 hasRatio(0.155))  
 AT085\_C3  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Restaurant)  $\nVdash$  hasRatio(0.29))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(BeautyService)  $\nVdash$   
 AT085\_C4 hasRatio(0.273))  
 AT085\_C5  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Bar/Cafe)  $\nVdash$  hasRatio(0.04))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(ConvenienceStore)  $\nVdash$   
 AT085\_C6 hasRatio(0.076))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(JewelryStore)  $\nVdash$   
 AT085\_C7 hasRatio(0.079))  
 AT086\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(School)  $\nVdash$  hasRatio(0.43))  
 AT086\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Bar/Cafe)  $\nVdash$  hasRatio(0.133))  
 AT086\_C3  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(NightClub)  $\nVdash$  hasRatio(0.3))  
 AT086\_C4  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.136))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Restaurant)  $\nVdash$   
 AT087\_C1 hasRatio(0.295))  
 AT087\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.705))  
 AT088\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Gym)  $\nVdash$  hasRatio(0.196))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Restaurant)  $\nVdash$   
 AT088\_C2 hasRatio(0.149))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(FurnitureStore)  $\nVdash$   
 AT088\_C3 hasRatio(0.135))  
 AT088\_C4  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.52))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Restaurant)  $\nVdash$   
 AT089\_C1 hasRatio(0.123))  
 AT089\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Bar/Cafe)  $\nVdash$  hasRatio(0.042))  
 AT089\_C3  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Lodging)  $\nVdash$  hasRatio(0.835))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(ClothingStore/ShoeStore)  $\nVdash$   
 AT090\_C1 hasRatio(0.013))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(CarRepair/CarWash)  $\nVdash$   
 AT090\_C2 hasRatio(0.014))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(CarDealer/CarRental)  $\nVdash$   
 AT090\_C3 hasRatio(0.025))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(PetStore/VeterinaryCare)  $\nVdash$   
 AT090\_C4 hasRatio(0.023))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Restaurant)  $\nVdash$   
 AT090\_C5 hasRatio(0.106))  
 AT090\_C6  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(BeautyService)  $\nVdash$



hasRatio(0.028))  
 AT090\_C7  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Bar/Cafe)  $\nVdash$  hasRatio(0.012))  
 AT090\_C8  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Laundry)  $\nVdash$  hasRatio(0.092))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(HardwareStore)  $\nVdash$   
 AT090\_C9 hasRatio(0.029))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(HomeGoodsStore)  $\nVdash$   
 AT090\_C10 hasRatio(0.02))  
 AT090\_C11  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Florist)  $\nVdash$  hasRatio(0.04))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(JewelryStore)  $\nVdash$   
 AT090\_C12 hasRatio(0.072))  
 AT090\_C13  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Lodging)  $\nVdash$  hasRatio(0.24))  
 AT090\_C14  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(NightClub)  $\nVdash$  hasRatio(0.027))  
 AT090\_C15  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Embassy)  $\nVdash$  hasRatio(0.022))  
 AT090\_C16  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.236))  
 AT091\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Gym)  $\nVdash$  hasRatio(0.034))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(ClothingStore/ShoeStore)  $\nVdash$   
 AT091\_C2 hasRatio(0.019))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(CarRepair/CarWash)  $\nVdash$   
 AT091\_C3 hasRatio(0.055))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(ElectronicsStore)  $\nVdash$   
 AT091\_C4 hasRatio(0.082))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(CarDealer/CarRental)  $\nVdash$   
 AT091\_C5 hasRatio(0.007))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Restaurant)  $\nVdash$   
 AT091\_C6 hasRatio(0.056))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(BeautyService)  $\nVdash$   
 AT091\_C7 hasRatio(0.056))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Supermarket)  $\nVdash$   
 AT091\_C8 hasRatio(0.074))  
 AT091\_C9  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(School)  $\nVdash$  hasRatio(0.17))  
 AT091\_C10  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Bar/Cafe)  $\nVdash$  hasRatio(0.011))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(DepartmentStore)  $\nVdash$   
 AT091\_C11 hasRatio(0.078))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(FurnitureStore)  $\nVdash$   
 AT091\_C12 hasRatio(0.014))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(HomeGoodsStore)  $\nVdash$   
 AT091\_C13 hasRatio(0.012))  
 AT091\_C14  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(BookStore)  $\nVdash$  hasRatio(0.049))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(BicycleStore)  $\nVdash$   
 AT091\_C15 hasRatio(0.006))  
 AT091\_C16  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Florist)  $\nVdash$  hasRatio(0.011))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(JewelryStore)  $\nVdash$   
 AT091\_C17 hasRatio(0.014))  
 AT091\_C18  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Lodging)  $\nVdash$  hasRatio(0.208))  
 AT091\_C19  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(ArtGallery)  $\nVdash$  hasRatio(0.043))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(ClothingStore/ShoeStore)  $\nVdash$   
 AT092\_C1 hasRatio(0.007))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(CarRepair/CarWash)  $\nVdash$   
 AT092\_C2 hasRatio(0.007))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(ElectronicsStore)  $\nVdash$   
 AT092\_C3 hasRatio(0.036))

AT092\_C4  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(PetStore/VeterinaryCare)  $\neg \forall$  hasRatio(0.012))  
 AT092\_C5  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(HealthService)  $\neg \forall$  hasRatio(0.004))  
 AT092\_C6  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(BeautyService)  $\neg \forall$  hasRatio(0.036))  
 AT092\_C7  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Supermarket)  $\neg \forall$  hasRatio(0.066))  
 AT092\_C8  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(School)  $\neg \forall$  hasRatio(0.01))  
 AT092\_C9  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Bar/Cafe)  $\neg \forall$  hasRatio(0.012))  
 AT092\_C10  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(DepartmentStore)  $\neg \forall$  hasRatio(0.139))  
 AT092\_C11  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(FurnitureStore)  $\neg \forall$  hasRatio(0.004))  
 AT092\_C12  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(HardwareStore)  $\neg \forall$  hasRatio(0.008))  
 AT092\_C13  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(HomeGoodsStore)  $\neg \forall$  hasRatio(0.016))  
 AT092\_C14  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Locksmith)  $\neg \forall$  hasRatio(0.02))  
 AT092\_C15  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(BookStore)  $\neg \forall$  hasRatio(0.022))  
 AT092\_C16  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(BicycleStore)  $\neg \forall$  hasRatio(0.006))  
 AT092\_C17  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(JewelryStore)  $\neg \forall$  hasRatio(0.006))  
 AT092\_C18  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(ArtGallery)  $\neg \forall$  hasRatio(0.008))  
 AT092\_C19  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Unknown)  $\neg \forall$  hasRatio(0.582))  
 AT093\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(ClothingStore/ShoeStore)  $\neg \forall$  hasRatio(0.015))  
 AT093\_C2  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(CarRepair/CarWash)  $\neg \forall$  hasRatio(0.047))  
 AT093\_C3  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(ElectronicsStore)  $\neg \forall$  hasRatio(0.051))  
 AT093\_C4  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Restaurant)  $\neg \forall$  hasRatio(0.019))  
 AT093\_C5  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(HealthService)  $\neg \forall$  hasRatio(0.034))  
 AT093\_C6  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(School)  $\neg \forall$  hasRatio(0.085))  
 AT093\_C7  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Bar/Cafe)  $\neg \forall$  hasRatio(0.013))  
 AT093\_C8  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(DepartmentStore)  $\neg \forall$  hasRatio(0.588))  
 AT093\_C9  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(MovieRental)  $\neg \forall$  hasRatio(0.046))  
 AT093\_C10  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(HomeGoodsStore)  $\neg \forall$  hasRatio(0.022))  
 AT093\_C11  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(BicycleStore)  $\neg \forall$  hasRatio(0.024))  
 AT093\_C12  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(JewelryStore)  $\neg \forall$  hasRatio(0.026))  
 AT093\_C13  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(NightClub)  $\neg \forall$  hasRatio(0.03))  
 AT094\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Gym)  $\neg \forall$  hasRatio(0.003))  
 AT094\_C2  $\sqsubseteq$ ArchetypeComponent  $\neg \forall$  hasComponent.Programme(Bank/PostOffice)  $\neg \forall$

hasRatio(0.025))  
 ⊑ArchetypeComponent ⊭hasComponent.Programme(ClothingStore/ShoeStore) ⊭  
 AT094\_C3 hasRatio(0.02))  
 ⊑ArchetypeComponent ⊭hasComponent.Programme(CarRepair/CarWash) ⊭  
 AT094\_C4 hasRatio(0.002))  
 ⊑ArchetypeComponent ⊭hasComponent.Programme(ElectronicsStore) ⊭  
 AT094\_C5 hasRatio(0.029))  
 ⊑ArchetypeComponent ⊭hasComponent.Programme(PetStore/VeterinaryCare) ⊭  
 AT094\_C6 hasRatio(0.003))  
 ⊑ArchetypeComponent ⊭hasComponent.Programme(Restaurant) ⊭  
 AT094\_C7 hasRatio(0.144))  
 ⊑ArchetypeComponent ⊭hasComponent.Programme(HealthService) ⊭  
 AT094\_C8 hasRatio(0.015))  
 ⊑ArchetypeComponent ⊭hasComponent.Programme(BeautyService) ⊭  
 AT094\_C9 hasRatio(0.073))  
 ⊑ArchetypeComponent ⊭hasComponent.Programme(Supermarket) ⊭  
 AT094\_C10 hasRatio(0.043))  
 ⊑ArchetypeComponent ⊭hasComponent.Programme(School) ⊭hasRatio(0.035))  
 AT094\_C11 ⊑ArchetypeComponent ⊭hasComponent.Programme(Bar/Cafe) ⊭hasRatio(0.015))  
 AT094\_C12 ⊑ArchetypeComponent ⊭hasComponent.Programme(DepartmentStore) ⊭  
 AT094\_C13 hasRatio(0.046))  
 ⊑ArchetypeComponent ⊭hasComponent.Programme(Laundry) ⊭hasRatio(0.003))  
 AT094\_C14 ⊑ArchetypeComponent ⊭hasComponent.Programme(ConvenienceStore) ⊭  
 AT094\_C15 hasRatio(0.009))  
 ⊑ArchetypeComponent ⊭hasComponent.Programme(FurnitureStore) ⊭  
 AT094\_C16 hasRatio(0.002))  
 ⊑ArchetypeComponent ⊭hasComponent.Programme(HomeGoodsStore) ⊭  
 AT094\_C17 hasRatio(0.008))  
 ⊑ArchetypeComponent ⊭hasComponent.Programme(Locksmith) ⊭hasRatio(0.004))  
 AT094\_C18 ⊑ArchetypeComponent ⊭hasComponent.Programme(BookStore) ⊭hasRatio(0.002))  
 AT094\_C19 ⊑ArchetypeComponent ⊭hasComponent.Programme(Pharmacy) ⊭hasRatio(0.039))  
 AT094\_C20 ⊑ArchetypeComponent ⊭hasComponent.Programme(BicycleStore) ⊭  
 AT094\_C21 hasRatio(0.001))  
 ⊑ArchetypeComponent ⊭hasComponent.Programme(Florist) ⊭hasRatio(0.002))  
 AT094\_C22 ⊑ArchetypeComponent ⊭hasComponent.Programme(JewelryStore) ⊭  
 AT094\_C23 hasRatio(0.012))  
 ⊑ArchetypeComponent ⊭hasComponent.Programme(Lodging) ⊭hasRatio(0.013))  
 AT094\_C24 ⊑ArchetypeComponent ⊭hasComponent.Programme(ArtGallery) ⊭hasRatio(0.002))  
 AT094\_C25 ⊑ArchetypeComponent ⊭hasComponent.Programme(LiquorStore) ⊭  
 AT094\_C26 hasRatio(0.002))  
 ⊑ArchetypeComponent ⊭hasComponent.Programme(Unknown) ⊭hasRatio(0.449))  
 AT094\_C27 ⊑ArchetypeComponent ⊭hasComponent.Programme(Bank/PostOffice) ⊭  
 AT095\_C1 hasRatio(0.008))  
 ⊑ArchetypeComponent ⊭hasComponent.Programme(ClothingStore/ShoeStore) ⊭  
 AT095\_C2 hasRatio(0.062))  
 ⊑ArchetypeComponent ⊭hasComponent.Programme(ElectronicsStore) ⊭  
 AT095\_C3 hasRatio(0.018))  
 ⊑ArchetypeComponent ⊭hasComponent.Programme(Restaurant) ⊭  
 AT095\_C4 hasRatio(0.272))  
 ⊑ArchetypeComponent ⊭hasComponent.Programme(BeautyService) ⊭  
 AT095\_C5 hasRatio(0.016))

AT095\_C6  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Supermarket)  $\not\models$   
 hasRatio(0.049))  
 AT095\_C7  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(School)  $\not\models$ hasRatio(0.008))  
 AT095\_C8  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Bar/Cafe)  $\not\models$ hasRatio(0.009))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(DepartmentStore)  $\not\models$   
 AT095\_C9 hasRatio(0.208))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(ConvenienceStore)  $\not\models$   
 AT095\_C10 hasRatio(0.031))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(HardwareStore)  $\not\models$   
 AT095\_C11 hasRatio(0.023))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(HomeGoodsStore)  $\not\models$   
 AT095\_C12 hasRatio(0.008))  
 AT095\_C13  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Florist)  $\not\models$ hasRatio(0.008))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(JewelryStore)  $\not\models$   
 AT095\_C14 hasRatio(0.055))  
 AT095\_C15  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Lodging)  $\not\models$ hasRatio(0.046))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(LiquorStore)  $\not\models$   
 AT095\_C16 hasRatio(0.013))  
 AT095\_C17  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Unknown)  $\not\models$ hasRatio(0.165))  
 AT096\_C1  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Gym)  $\not\models$ hasRatio(0.016))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Bank/PostOffice)  $\not\models$   
 AT096\_C2 hasRatio(0.01))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(ClothingStore/ShoeStore)  $\not\models$   
 AT096\_C3 hasRatio(0.03))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(CarRepair/CarWash)  $\not\models$   
 AT096\_C4 hasRatio(0.01))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(ElectronicsStore)  $\not\models$   
 AT096\_C5 hasRatio(0.042))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(CarDealer/CarRental)  $\not\models$   
 AT096\_C6 hasRatio(0.022))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(PetStore/VeterinaryCare)  $\not\models$   
 AT096\_C7 hasRatio(0.01))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Restaurant)  $\not\models$   
 AT096\_C8 hasRatio(0.059))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(HealthService)  $\not\models$   
 AT096\_C9 hasRatio(0.007))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(BeautyService)  $\not\models$   
 AT096\_C10 hasRatio(0.271))  
 AT096\_C11  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(School)  $\not\models$ hasRatio(0.104))  
 AT096\_C12  $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Bar/Cafe)  $\not\models$ hasRatio(0.016))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(DepartmentStore)  $\not\models$   
 AT096\_C13 hasRatio(0.12))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(Laundry)  $\not\models$ hasRatio(0.02))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(ConvenienceStore)  $\not\models$   
 AT096\_C15 hasRatio(0.005))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(MovieRental)  $\not\models$   
 AT096\_C16 hasRatio(0.009))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(FurnitureStore)  $\not\models$   
 AT096\_C17 hasRatio(0.036))  
 $\sqsubseteq$ ArchetypeComponent  $\not\models$ hasComponent.Programme(HardwareStore)  $\not\models$   
 AT096\_C18 hasRatio(0.007))

AT096\_C19  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(HomeGoodsStore)  $\nVdash$  hasRatio(0.014))  
 AT096\_C20  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Pharmacy)  $\nVdash$  hasRatio(0.088))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(BicycleStore)  $\nVdash$  hasRatio(0.005))  
 AT096\_C21  
 AT096\_C22  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Florist)  $\nVdash$  hasRatio(0.009))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(JewelryStore)  $\nVdash$  hasRatio(0.011))  
 AT096\_C23  
 AT096\_C24  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Lodging)  $\nVdash$  hasRatio(0.053))  
 AT096\_C25  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(ArtGallery)  $\nVdash$  hasRatio(0.007))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(LiquorStore)  $\nVdash$  hasRatio(0.015))  
 AT096\_C26  
 AT096\_C27  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(NightClub)  $\nVdash$  hasRatio(0.006))  
 AT097\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Lodging)  $\nVdash$  hasRatio(1.0))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(ConvenienceStore)  $\nVdash$  hasRatio(0.768))  
 AT098\_C1  
 AT098\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.232))  
 AT099\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Gym)  $\nVdash$  hasRatio(0.836))  
 AT099\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.164))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(HomeGoodsStore)  $\nVdash$  hasRatio(0.087))  
 AT100\_C1  
 AT100\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.913))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Restaurant)  $\nVdash$  hasRatio(0.485))  
 AT101\_C1  
 AT101\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.515))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(FurnitureStore)  $\nVdash$  hasRatio(0.236))  
 AT102\_C1  
 AT102\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.764))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(CarRepair/CarWash)  $\nVdash$  hasRatio(0.103))  
 AT103\_C1  
 AT103\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.897))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Restaurant)  $\nVdash$  hasRatio(0.098))  
 AT104\_C1  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(BeautyService)  $\nVdash$  hasRatio(0.038))  
 AT104\_C2  
 AT104\_C3  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Bar/Cafe)  $\nVdash$  hasRatio(0.017))  
 AT104\_C4  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Lodging)  $\nVdash$  hasRatio(0.332))  
 AT104\_C5  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(ArtGallery)  $\nVdash$  hasRatio(0.041))  
 AT104\_C6  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.474))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(ClothingStore/ShoeStore)  $\nVdash$  hasRatio(0.035))  
 AT105\_C1  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(ElectronicsStore)  $\nVdash$  hasRatio(0.123))  
 AT105\_C2  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Restaurant)  $\nVdash$  hasRatio(0.046))  
 AT105\_C3  
 AT105\_C4  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Lodging)  $\nVdash$  hasRatio(0.624))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(LiquorStore)  $\nVdash$  hasRatio(0.088))  
 AT105\_C5  
 AT105\_C6  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.084))  
 AT106\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(CarRepair/CarWash)  $\nVdash$

hasRatio(0.007))  
 ⊑ArchetypeComponent ⊧ hasComponent.Programme(PetStore/VeterinaryCare) ⊧ hasRatio(0.011))  
 AT106\_C2 ⊑ArchetypeComponent ⊧ hasComponent.Programme(Restaurant) ⊧ hasRatio(0.067))  
 AT106\_C3 ⊑ArchetypeComponent ⊧ hasComponent.Programme(HealthService) ⊧ hasRatio(0.015))  
 AT106\_C4 ⊑ArchetypeComponent ⊧ hasComponent.Programme(BeautyService) ⊧ hasRatio(0.039))  
 AT106\_C5 ⊑ArchetypeComponent ⊧ hasComponent.Programme(School) ⊧ hasRatio(0.055))  
 AT106\_C6 ⊑ArchetypeComponent ⊧ hasComponent.Programme(Bar/Cafe) ⊧ hasRatio(0.023))  
 AT106\_C7 ⊑ArchetypeComponent ⊧ hasComponent.Programme(ConvenienceStore) ⊧ hasRatio(0.011))  
 AT106\_C8 ⊑ArchetypeComponent ⊧ hasComponent.Programme(Pharmacy) ⊧ hasRatio(0.093))  
 AT106\_C9 ⊑ArchetypeComponent ⊧ hasComponent.Programme(Lodging) ⊧ hasRatio(0.113))  
 AT106\_C10 ⊑ArchetypeComponent ⊧ hasComponent.Programme(Unknown) ⊧ hasRatio(0.566))  
 AT106\_C11 ⊑ArchetypeComponent ⊧ hasComponent.Programme(CarRepair/CarWash) ⊧ hasRatio(0.044))  
 AT107\_C1 ⊑ArchetypeComponent ⊧ hasComponent.Programme(CarDealer/CarRental) ⊧ hasRatio(0.06))  
 AT107\_C2 ⊑ArchetypeComponent ⊧ hasComponent.Programme(FurnitureStore) ⊧ hasRatio(0.01))  
 AT107\_C3 ⊑ArchetypeComponent ⊧ hasComponent.Programme(Unknown) ⊧ hasRatio(0.887))  
 AT107\_C4 ⊑ArchetypeComponent ⊧ hasComponent.Programme(Restaurant) ⊧ hasRatio(0.021))  
 AT108\_C1 ⊑ArchetypeComponent ⊧ hasComponent.Programme(Lodging) ⊧ hasRatio(0.567))  
 AT108\_C2 ⊑ArchetypeComponent ⊧ hasComponent.Programme(Unknown) ⊧ hasRatio(0.412))  
 AT108\_C3 ⊑ArchetypeComponent ⊧ hasComponent.Programme(CarRepair/CarWash) ⊧ hasRatio(0.012))  
 AT109\_C1 ⊑ArchetypeComponent ⊧ hasComponent.Programme(Restaurant) ⊧ hasRatio(0.015))  
 AT109\_C2 ⊑ArchetypeComponent ⊧ hasComponent.Programme(DepartmentStore) ⊧ hasRatio(0.223))  
 AT109\_C3 ⊑ArchetypeComponent ⊧ hasComponent.Programme(HardwareStore) ⊧ hasRatio(0.024))  
 AT109\_C4 ⊑ArchetypeComponent ⊧ hasComponent.Programme(Lodging) ⊧ hasRatio(0.396))  
 AT109\_C5 ⊑ArchetypeComponent ⊧ hasComponent.Programme(Embassy) ⊧ hasRatio(0.018))  
 AT109\_C6 ⊑ArchetypeComponent ⊧ hasComponent.Programme(Unknown) ⊧ hasRatio(0.311))  
 AT109\_C7 ⊑ArchetypeComponent ⊧ hasComponent.Programme(ClothingStore/ShoeStore) ⊧ hasRatio(0.015))  
 AT110\_C1 ⊑ArchetypeComponent ⊧ hasComponent.Programme(Restaurant) ⊧ hasRatio(0.1))  
 AT110\_C2 ⊑ArchetypeComponent ⊧ hasComponent.Programme(BeautyService) ⊧ hasRatio(0.094))  
 AT110\_C3 ⊑ArchetypeComponent ⊧ hasComponent.Programme(Bar/Cafe) ⊧ hasRatio(0.068))  
 AT110\_C4 ⊑ArchetypeComponent ⊧ hasComponent.Programme(ConvenienceStore) ⊧ hasRatio(0.052))  
 AT110\_C5 ⊑ArchetypeComponent ⊧ hasComponent.Programme(FurnitureStore) ⊧ hasRatio(0.036))  
 AT110\_C6 ⊑ArchetypeComponent ⊧ hasComponent.Programme(BookStore) ⊧ hasRatio(0.048))  
 AT110\_C7 ⊑ArchetypeComponent ⊧ hasComponent.Programme(Florist) ⊧ hasRatio(0.045))  
 AT110\_C8

AT110\_C9  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Lodging)  $\Gamma \nabla$  hasRatio(0.542))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(ElectronicsStore)  $\Gamma \nabla$   
 AT111\_C1 hasRatio(0.263))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(PetStore/VeterinaryCare)  $\Gamma \nabla$   
 AT111\_C2 hasRatio(0.127))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(BeautyService)  $\Gamma \nabla$   
 AT111\_C3 hasRatio(0.155))  
 AT111\_C4  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Bar/Cafe)  $\Gamma \nabla$  hasRatio(0.068))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(HardwareStore)  $\Gamma \nabla$   
 AT111\_C5 hasRatio(0.164))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(HomeGoodsStore)  $\Gamma \nabla$   
 AT111\_C6 hasRatio(0.114))  
 AT111\_C7  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Unknown)  $\Gamma \nabla$  hasRatio(0.109))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(ClothingStore/ShoeStore)  $\Gamma \nabla$   
 AT112\_C1 hasRatio(0.153))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(PetStore/VeterinaryCare)  $\Gamma \nabla$   
 AT112\_C2 hasRatio(0.011))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Restaurant)  $\Gamma \nabla$   
 AT112\_C3 hasRatio(0.109))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(HealthService)  $\Gamma \nabla$   
 AT112\_C4 hasRatio(0.007))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(BeautyService)  $\Gamma \nabla$   
 AT112\_C5 hasRatio(0.118))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Supermarket)  $\Gamma \nabla$   
 AT112\_C6 hasRatio(0.122))  
 AT112\_C7  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(School)  $\Gamma \nabla$  hasRatio(0.019))  
 AT112\_C8  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Bar/Cafe)  $\Gamma \nabla$  hasRatio(0.017))  
 AT112\_C9  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Laundry)  $\Gamma \nabla$  hasRatio(0.022))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(ConvenienceStore)  $\Gamma \nabla$   
 AT112\_C10 hasRatio(0.011))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(MovieRental)  $\Gamma \nabla$   
 AT112\_C11 hasRatio(0.02))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(FurnitureStore)  $\Gamma \nabla$   
 AT112\_C12 hasRatio(0.023))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(HomeGoodsStore)  $\Gamma \nabla$   
 AT112\_C13 hasRatio(0.048))  
 AT112\_C14  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Locksmith)  $\Gamma \nabla$  hasRatio(0.036))  
 AT112\_C15  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(BookStore)  $\Gamma \nabla$  hasRatio(0.02))  
 AT112\_C16  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Pharmacy)  $\Gamma \nabla$  hasRatio(0.094))  
 AT112\_C17  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Florist)  $\Gamma \nabla$  hasRatio(0.019))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(JewelryStore)  $\Gamma \nabla$   
 AT112\_C18 hasRatio(0.034))  
 AT112\_C19  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(ArtGallery)  $\Gamma \nabla$  hasRatio(0.014))  
 AT112\_C20  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Unknown)  $\Gamma \nabla$  hasRatio(0.104))  
 AT113\_C1  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Gym)  $\Gamma \nabla$  hasRatio(0.024))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(ClothingStore/ShoeStore)  $\Gamma \nabla$   
 AT113\_C2 hasRatio(0.024))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(ElectronicsStore)  $\Gamma \nabla$   
 AT113\_C3 hasRatio(0.036))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(CarDealer/CarRental)  $\Gamma \nabla$   
 AT113\_C4 hasRatio(0.025))

AT113\_C5  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Restaurant)  $\Gamma \nabla$  hasRatio(0.058))  
 AT113\_C6  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(BeautyService)  $\Gamma \nabla$  hasRatio(0.161))  
 AT113\_C7  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(School)  $\Gamma \nabla$  hasRatio(0.049))  
 AT113\_C8  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Bar/Cafe)  $\Gamma \nabla$  hasRatio(0.049))  
 AT113\_C9  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(DepartmentStore)  $\Gamma \nabla$  hasRatio(0.136))  
 AT113\_C10  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(FurnitureStore)  $\Gamma \nabla$  hasRatio(0.008))  
 AT113\_C11  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Pharmacy)  $\Gamma \nabla$  hasRatio(0.05))  
 AT113\_C12  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Florist)  $\Gamma \nabla$  hasRatio(0.02))  
 AT113\_C13  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(JewelryStore)  $\Gamma \nabla$  hasRatio(0.006))  
 AT113\_C14  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Lodging)  $\Gamma \nabla$  hasRatio(0.181))  
 AT113\_C15  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(NightClub)  $\Gamma \nabla$  hasRatio(0.034))  
 AT113\_C16  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Embassy)  $\Gamma \nabla$  hasRatio(0.006))  
 AT113\_C17  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Unknown)  $\Gamma \nabla$  hasRatio(0.133))  
 AT114\_C1  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Lodging)  $\Gamma \nabla$  hasRatio(0.928))  
 AT114\_C2  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Unknown)  $\Gamma \nabla$  hasRatio(0.072))  
 AT115\_C1  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Restaurant)  $\Gamma \nabla$  hasRatio(0.008))  
 AT115\_C2  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(BeautyService)  $\Gamma \nabla$  hasRatio(0.025))  
 AT115\_C3  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(HomeGoodsStore)  $\Gamma \nabla$  hasRatio(0.009))  
 AT115\_C4  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Lodging)  $\Gamma \nabla$  hasRatio(0.215))  
 AT115\_C5  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Unknown)  $\Gamma \nabla$  hasRatio(0.744))  
 AT116\_C1  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Restaurant)  $\Gamma \nabla$  hasRatio(0.1))  
 AT116\_C2  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(BeautyService)  $\Gamma \nabla$  hasRatio(0.157))  
 AT116\_C3  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(ConvenienceStore)  $\Gamma \nabla$  hasRatio(0.065))  
 AT116\_C4  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Lodging)  $\Gamma \nabla$  hasRatio(0.678))  
 AT117\_C1  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(ClothingStore/ShoeStore)  $\Gamma \nabla$  hasRatio(0.036))  
 AT117\_C2  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(CarRepair/CarWash)  $\Gamma \nabla$  hasRatio(0.019))  
 AT117\_C3  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(CarDealer/CarRental)  $\Gamma \nabla$  hasRatio(0.033))  
 AT117\_C4  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Restaurant)  $\Gamma \nabla$  hasRatio(0.164))  
 AT117\_C5  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(HealthService)  $\Gamma \nabla$  hasRatio(0.021))  
 AT117\_C6  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(BeautyService)  $\Gamma \nabla$  hasRatio(0.184))  
 AT117\_C7  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(DepartmentStore)  $\Gamma \nabla$  hasRatio(0.358))  
 AT117\_C8  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(JewelryStore)  $\Gamma \nabla$  hasRatio(0.032))  
 AT117\_C9  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(LiquorStore)  $\Gamma \nabla$



hasRatio(0.089))  
 AT117\_C10  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(NightClub)  $\nVdash$  hasRatio(0.036))  
 AT117\_C11  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.029))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(ClothingStore/ShoeStore)  $\nVdash$   
 AT118\_C1 hasRatio(0.017))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(CarRepair/CarWash)  $\nVdash$   
 AT118\_C2 hasRatio(0.019))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(ElectronicsStore)  $\nVdash$   
 AT118\_C3 hasRatio(0.121))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Restaurant)  $\nVdash$   
 AT118\_C4 hasRatio(0.023))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(BeautyService)  $\nVdash$   
 AT118\_C5 hasRatio(0.072))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(HardwareStore)  $\nVdash$   
 AT118\_C6 hasRatio(0.038))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(JewelryStore)  $\nVdash$   
 AT118\_C7 hasRatio(0.093))  
 AT118\_C8  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Lodging)  $\nVdash$  hasRatio(0.618))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(ClothingStore/ShoeStore)  $\nVdash$   
 AT119\_C1 hasRatio(0.173))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(BeautyService)  $\nVdash$   
 AT119\_C2 hasRatio(0.025))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(DepartmentStore)  $\nVdash$   
 AT119\_C3 hasRatio(0.248))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(JewelryStore)  $\nVdash$   
 AT119\_C4 hasRatio(0.154))  
 AT119\_C5  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(NightClub)  $\nVdash$  hasRatio(0.025))  
 AT119\_C6  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.375))  
 AT120\_C1  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Gym)  $\nVdash$  hasRatio(0.001))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Bank/PostOffice)  $\nVdash$   
 AT120\_C2 hasRatio(0.004))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(ClothingStore/ShoeStore)  $\nVdash$   
 AT120\_C3 hasRatio(0.04))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(CarRepair/CarWash)  $\nVdash$   
 AT120\_C4 hasRatio(0.001))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(ElectronicsStore)  $\nVdash$   
 AT120\_C5 hasRatio(0.014))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Restaurant)  $\nVdash$   
 AT120\_C6 hasRatio(0.057))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(HealthService)  $\nVdash$   
 AT120\_C7 hasRatio(0.003))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(BeautyService)  $\nVdash$   
 AT120\_C8 hasRatio(0.029))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Supermarket)  $\nVdash$   
 AT120\_C9 hasRatio(0.022))  
 AT120\_C10  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(School)  $\nVdash$  hasRatio(0.002))  
 AT120\_C11  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Bar/Cafe)  $\nVdash$  hasRatio(0.007))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(DepartmentStore)  $\nVdash$   
 AT120\_C12 hasRatio(0.024))  
 AT120\_C13  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Laundry)  $\nVdash$  hasRatio(0.002))  
 AT120\_C14  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(HomeGoodsStore)  $\nVdash$

hasRatio(0.003))  
 AT120\_C15  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Pharmacy)  $\nVdash$  hasRatio(0.013))  
 AT120\_C16  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Florist)  $\nVdash$  hasRatio(0.003))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(JewelryStore)  $\nVdash$   
 AT120\_C17 hasRatio(0.013))  
 AT120\_C18  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Lodging)  $\nVdash$  hasRatio(0.031))  
 AT120\_C19  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(ArtGallery)  $\nVdash$  hasRatio(0.003))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(LiquorStore)  $\nVdash$   
 AT120\_C20 hasRatio(0.003))  
 AT120\_C21  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Embassy)  $\nVdash$  hasRatio(0.001))  
 AT120\_C22  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.724))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Restaurant)  $\nVdash$   
 AT121\_C1 hasRatio(0.053))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(BeautyService)  $\nVdash$   
 AT121\_C2 hasRatio(0.084))  
 AT121\_C3  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Bar/Cafe)  $\nVdash$  hasRatio(0.037))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(ConvenienceStore)  $\nVdash$   
 AT121\_C4 hasRatio(0.07))  
 AT121\_C5  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.757))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(HomeGoodsStore)  $\nVdash$   
 AT122\_C1 hasRatio(0.707))  
 AT122\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.293))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(BeautyService)  $\nVdash$   
 AT123\_C1 hasRatio(0.537))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(JewelryStore)  $\nVdash$   
 AT123\_C2 hasRatio(0.463))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Restaurant)  $\nVdash$   
 AT124\_C1 hasRatio(0.589))  
 AT124\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.411))  
 AT125\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Restaurant)  $\nVdash$  hasRatio(0.06))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(BeautyService)  $\nVdash$   
 AT125\_C2 hasRatio(0.095))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(MovieRental)  $\nVdash$   
 AT125\_C3 hasRatio(0.144))  
 AT125\_C4  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.701))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Restaurant)  $\nVdash$   
 AT126\_C1 hasRatio(0.353))  
 AT126\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(NightClub)  $\nVdash$  hasRatio(0.543))  
 AT126\_C3  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.104))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(CarRepair/CarWash)  $\nVdash$   
 AT127\_C1 hasRatio(0.061))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(BeautyService)  $\nVdash$   
 AT127\_C2 hasRatio(0.116))  
 AT127\_C3  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Pharmacy)  $\nVdash$  hasRatio(0.414))  
 AT127\_C4  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.409))  
 AT128\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Florist)  $\nVdash$  hasRatio(1.0))  
 AT129\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Bar/Cafe)  $\nVdash$  hasRatio(0.35))  
 AT129\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(Museum)  $\nVdash$  hasRatio(0.65))  
 $\sqsubseteq$ ArchetypeComponent  $\nVdash$  hasComponent.Programme(ClothingStore/ShoeStore)  $\nVdash$   
 AT130\_C1 hasRatio(0.043))

AT130\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(PetStore/VeterinaryCare)  $\nVdash$ hasRatio(0.073))  
 AT130\_C3  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(BeautyService)  $\nVdash$ hasRatio(0.089))  
 AT130\_C4  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(HomeGoodsStore)  $\nVdash$ hasRatio(0.065))  
 AT130\_C5  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Embassy)  $\nVdash$ hasRatio(0.071))  
 AT130\_C6  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Unknown)  $\nVdash$ hasRatio(0.659))  
 AT131\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Gym)  $\nVdash$ hasRatio(0.359))  
 AT131\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Restaurant)  $\nVdash$ hasRatio(0.273))  
 AT131\_C3  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Unknown)  $\nVdash$ hasRatio(0.368))  
 AT132\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(HardwareStore)  $\nVdash$ hasRatio(0.747))  
 AT132\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Unknown)  $\nVdash$ hasRatio(0.253))  
 AT133\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(PetStore/VeterinaryCare)  $\nVdash$ hasRatio(0.269))  
 AT133\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(BeautyService)  $\nVdash$ hasRatio(0.164))  
 AT133\_C3  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(School)  $\nVdash$ hasRatio(0.231))  
 AT133\_C4  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Unknown)  $\nVdash$ hasRatio(0.335))  
 AT134\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(ElectronicsStore)  $\nVdash$ hasRatio(1.0))  
 AT135\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(ConvenienceStore)  $\nVdash$ hasRatio(0.339))  
 AT135\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(LiquorStore)  $\nVdash$ hasRatio(0.496))  
 AT135\_C3  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Unknown)  $\nVdash$ hasRatio(0.165))  
 AT136\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Bank/PostOffice)  $\nVdash$ hasRatio(0.542))  
 AT136\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(CarDealer/CarRental)  $\nVdash$ hasRatio(0.308))  
 AT136\_C3  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Bar/Cafe)  $\nVdash$ hasRatio(0.15))  
 AT137\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(ElectronicsStore)  $\nVdash$ hasRatio(0.297))  
 AT137\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(PetStore/VeterinaryCare)  $\nVdash$ hasRatio(0.072))  
 AT137\_C3  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Restaurant)  $\nVdash$ hasRatio(0.39))  
 AT137\_C4  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Locksmith)  $\nVdash$ hasRatio(0.241))  
 AT138\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Lodging)  $\nVdash$ hasRatio(1.0))  
 AT139\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Supermarket)  $\nVdash$ hasRatio(0.959))  
 AT139\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(Unknown)  $\nVdash$ hasRatio(0.041))  
 AT140\_C1  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(PetStore/VeterinaryCare)  $\nVdash$ hasRatio(0.063))  
 AT140\_C2  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(HealthService)  $\nVdash$ hasRatio(0.044))  
 AT140\_C3  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(BeautyService)  $\nVdash$ hasRatio(0.077))  
 AT140\_C4  $\sqsubseteq$ ArchetypeComponent  $\nVdash$ hasComponent.Programme(DepartmentStore)  $\nVdash$ hasRatio(0.752))

AT140\_C5  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(ConvenienceStore)  $\neg$ hasRatio(0.064))  
 AT141\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(ElectronicsStore)  $\neg$ hasRatio(0.096))  
 AT141\_C2  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(PetStore/VeterinaryCare)  $\neg$ hasRatio(0.092))  
 AT141\_C3  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(BeautyService)  $\neg$ hasRatio(0.113))  
 AT141\_C4  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(School)  $\neg$ hasRatio(0.079))  
 AT141\_C5  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(Laundry)  $\neg$ hasRatio(0.093))  
 AT141\_C6  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(HomeGoodsStore)  $\neg$ hasRatio(0.041))  
 AT141\_C7  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(Lodging)  $\neg$ hasRatio(0.486))  
 AT142\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(Gym)  $\neg$ hasRatio(0.069))  
 AT142\_C2  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(ClothingStore/ShoeStore)  $\neg$ hasRatio(0.04))  
 AT142\_C3  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(Restaurant)  $\neg$ hasRatio(0.263))  
 AT142\_C4  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(BeautyService)  $\neg$ hasRatio(0.165))  
 AT142\_C5  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(Bar/Cafe)  $\neg$ hasRatio(0.036))  
 AT142\_C6  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(Laundry)  $\neg$ hasRatio(0.137))  
 AT142\_C7  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(ConvenienceStore)  $\neg$ hasRatio(0.068))  
 AT142\_C8  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(Unknown)  $\neg$ hasRatio(0.221))  
 AT143\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(ElectronicsStore)  $\neg$ hasRatio(0.07))  
 AT143\_C2  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(Restaurant)  $\neg$ hasRatio(0.157))  
 AT143\_C3  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(BeautyService)  $\neg$ hasRatio(0.205))  
 AT143\_C4  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(Supermarket)  $\neg$ hasRatio(0.38))  
 AT143\_C5  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(School)  $\neg$ hasRatio(0.058))  
 AT143\_C6  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(Bar/Cafe)  $\neg$ hasRatio(0.018))  
 AT143\_C7  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(BookStore)  $\neg$ hasRatio(0.062))  
 AT143\_C8  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(LiquorStore)  $\neg$ hasRatio(0.05))  
 AT144\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(Restaurant)  $\neg$ hasRatio(0.339))  
 AT144\_C2  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(Bar/Cafe)  $\neg$ hasRatio(0.017))  
 AT144\_C3  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(ConvenienceStore)  $\neg$ hasRatio(0.031))  
 AT144\_C4  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(Lodging)  $\neg$ hasRatio(0.328))  
 AT144\_C5  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(NightClub)  $\neg$ hasRatio(0.037))  
 AT144\_C6  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(Unknown)  $\neg$ hasRatio(0.248))  
 AT145\_C1  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(ClothingStore/ShoeStore)  $\neg$ hasRatio(0.011))  
 AT145\_C2  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(PetStore/VeterinaryCare)  $\neg$ hasRatio(0.019))  
 AT145\_C3  $\sqsubseteq$ ArchetypeComponent  $\neg$ hasComponent.Programme(Restaurant)  $\neg$ hasRatio(0.073))

AT145\_C4  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(BeautyService)  $\Gamma \nabla$  hasRatio(0.114))  
 AT145\_C5  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(School)  $\Gamma \nabla$  hasRatio(0.032))  
 AT145\_C6  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Bar/Cafe)  $\Gamma \nabla$  hasRatio(0.01))  
 AT145\_C7  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(DepartmentStore)  $\Gamma \nabla$  hasRatio(0.669))  
 AT145\_C8  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Laundry)  $\Gamma \nabla$  hasRatio(0.038))  
 AT145\_C9  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(HomeGoodsStore)  $\Gamma \nabla$  hasRatio(0.034))  
 AT146\_C1  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Restaurant)  $\Gamma \nabla$  hasRatio(0.116))  
 AT146\_C2  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(HealthService)  $\Gamma \nabla$  hasRatio(0.034))  
 AT146\_C3  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(BeautyService)  $\Gamma \nabla$  hasRatio(0.122))  
 AT146\_C4  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Supermarket)  $\Gamma \nabla$  hasRatio(0.562))  
 AT146\_C5  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(School)  $\Gamma \nabla$  hasRatio(0.086))  
 AT146\_C6  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Bar/Cafe)  $\Gamma \nabla$  hasRatio(0.08))  
 AT147\_C1  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(BeautyService)  $\Gamma \nabla$  hasRatio(0.499))  
 AT147\_C2  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(HomeGoodsStore)  $\Gamma \nabla$  hasRatio(0.147))  
 AT147\_C3  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Locksmith)  $\Gamma \nabla$  hasRatio(0.275))  
 AT147\_C4  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(BicycleStore)  $\Gamma \nabla$  hasRatio(0.079))  
 AT148\_C1  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Restaurant)  $\Gamma \nabla$  hasRatio(0.353))  
 AT148\_C2  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(HealthService)  $\Gamma \nabla$  hasRatio(0.104))  
 AT148\_C3  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(BeautyService)  $\Gamma \nabla$  hasRatio(0.37))  
 AT148\_C4  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Bar/Cafe)  $\Gamma \nabla$  hasRatio(0.081))  
 AT148\_C5  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Unknown)  $\Gamma \nabla$  hasRatio(0.092))  
 AT149\_C1  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(PetStore/VeterinaryCare)  $\Gamma \nabla$  hasRatio(0.135))  
 AT149\_C2  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Restaurant)  $\Gamma \nabla$  hasRatio(0.053))  
 AT149\_C3  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(HealthService)  $\Gamma \nabla$  hasRatio(0.047))  
 AT149\_C4  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(BeautyService)  $\Gamma \nabla$  hasRatio(0.495))  
 AT149\_C5  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Laundry)  $\Gamma \nabla$  hasRatio(0.137))  
 AT149\_C6  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(ConvenienceStore)  $\Gamma \nabla$  hasRatio(0.068))  
 AT149\_C7  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(BicycleStore)  $\Gamma \nabla$  hasRatio(0.065))  
 AT150\_C1  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(Restaurant)  $\Gamma \nabla$  hasRatio(0.19))  
 AT150\_C2  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(HealthService)  $\Gamma \nabla$  hasRatio(0.084))  
 AT150\_C3  $\sqsubseteq$ ArchetypeComponent  $\Gamma \nabla$  hasComponent.Programme(BeautyService)  $\Gamma \nabla$

hasRatio(0.149))  
 AT150\_C4  $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(Bar/Cafe)  $\Gamma \forall$  hasRatio(0.032))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(ConvenienceStore)  $\Gamma \forall$   
 AT150\_C5 hasRatio(0.062))  
 AT150\_C6  $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(Unknown)  $\Gamma \forall$  hasRatio(0.483))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(CarDealer/CarRental)  $\Gamma \forall$   
 AT151\_C1 hasRatio(0.09))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(Restaurant)  $\Gamma \forall$   
 AT151\_C2 hasRatio(0.192))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(BeautyService)  $\Gamma \forall$   
 AT151\_C3 hasRatio(0.201))  
 AT151\_C4  $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(Laundry)  $\Gamma \forall$  hasRatio(0.167))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(ConvenienceStore)  $\Gamma \forall$   
 AT151\_C5 hasRatio(0.083))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(HardwareStore)  $\Gamma \forall$   
 AT151\_C6 hasRatio(0.106))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(HomeGoodsStore)  $\Gamma \forall$   
 AT151\_C7 hasRatio(0.074))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(JewelryStore)  $\Gamma \forall$   
 AT151\_C8 hasRatio(0.087))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(Restaurant)  $\Gamma \forall$   
 AT152\_C1 hasRatio(0.111))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(HealthService)  $\Gamma \forall$   
 AT152\_C2 hasRatio(0.098))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(BeautyService)  $\Gamma \forall$   
 AT152\_C3 hasRatio(0.26))  
 AT152\_C4  $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(School)  $\Gamma \forall$  hasRatio(0.367))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(ConvenienceStore)  $\Gamma \forall$   
 AT152\_C5 hasRatio(0.072))  
 AT152\_C6  $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(ArtGallery)  $\Gamma \forall$  hasRatio(0.092))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(ClothingStore/ShoeStore)  $\Gamma \forall$   
 AT153\_C1 hasRatio(0.021))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(ElectronicsStore)  $\Gamma \forall$   
 AT153\_C2 hasRatio(0.15))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(PetStore/VeterinaryCare)  $\Gamma \forall$   
 AT153\_C3 hasRatio(0.036))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(Restaurant)  $\Gamma \forall$   
 AT153\_C4 hasRatio(0.254))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(HealthService)  $\Gamma \forall$   
 AT153\_C5 hasRatio(0.025))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(BeautyService)  $\Gamma \forall$   
 AT153\_C6 hasRatio(0.309))  
 AT153\_C7  $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(School)  $\Gamma \forall$  hasRatio(0.062))  
 AT153\_C8  $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(Bar/Cafe)  $\Gamma \forall$  hasRatio(0.039))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(ConvenienceStore)  $\Gamma \forall$   
 AT153\_C9 hasRatio(0.037))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(MovieRental)  $\Gamma \forall$   
 AT153\_C10 hasRatio(0.067))  
 $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(Bank/PostOffice)  $\Gamma \forall$   
 AT154\_C1 hasRatio(0.258))  
 AT154\_C2  $\sqsubseteq$ ArchetypeComponent  $\Gamma \forall$  hasComponent.Programme(HealthService)  $\Gamma \forall$

hasRatio(0.185))  
 ⊑ArchetypeComponent ⊧ hasComponent.Programme(BeautyService) ⊧  
 AT154\_C3 hasRatio(0.164))  
 ⊑ArchetypeComponent ⊧ hasComponent.Programme(ConvenienceStore) ⊧  
 AT154\_C4 hasRatio(0.136))  
 AT154\_C5 ⊑ArchetypeComponent ⊧ hasComponent.Programme(BookStore) ⊧ hasRatio(0.249))  
 AT154\_C6 ⊑ArchetypeComponent ⊧ hasComponent.Programme(Unknown) ⊧ hasRatio(0.008))  
 ⊑ArchetypeComponent ⊧ hasComponent.Programme(ElectronicsStore) ⊧  
 AT155\_C1 hasRatio(0.239))  
 ⊑ArchetypeComponent ⊧ hasComponent.Programme(CarDealer/CarRental) ⊧  
 AT155\_C2 hasRatio(0.252))  
 ⊑ArchetypeComponent ⊧ hasComponent.Programme(FurnitureStore) ⊧  
 AT155\_C3 hasRatio(0.081))  
 AT155\_C4 ⊑ArchetypeComponent ⊧ hasComponent.Programme(BookStore) ⊧ hasRatio(0.427))  
 ⊑ArchetypeComponent ⊧ hasComponent.Programme(ClothingStore/ShoeStore) ⊧  
 AT156\_C1 hasRatio(0.018))  
 ⊑ArchetypeComponent ⊧ hasComponent.Programme(ElectronicsStore) ⊧  
 AT156\_C2 hasRatio(0.032))  
 ⊑ArchetypeComponent ⊧ hasComponent.Programme(PetStore/VeterinaryCare) ⊧  
 AT156\_C3 hasRatio(0.015))  
 ⊑ArchetypeComponent ⊧ hasComponent.Programme(Restaurant) ⊧  
 AT156\_C4 hasRatio(0.217))  
 ⊑ArchetypeComponent ⊧ hasComponent.Programme(HealthService) ⊧  
 AT156\_C5 hasRatio(0.032))  
 ⊑ArchetypeComponent ⊧ hasComponent.Programme(BeautyService) ⊧  
 AT156\_C6 hasRatio(0.17))  
 AT156\_C7 ⊑ArchetypeComponent ⊧ hasComponent.Programme(Bar/Cafe) ⊧ hasRatio(0.058))  
 ⊑ArchetypeComponent ⊧ hasComponent.Programme(DepartmentStore) ⊧  
 AT156\_C8 hasRatio(0.184))  
 AT156\_C9 ⊑ArchetypeComponent ⊧ hasComponent.Programme(Laundry) ⊧ hasRatio(0.031))  
 ⊑ArchetypeComponent ⊧ hasComponent.Programme(ConvenienceStore) ⊧  
 AT156\_C10 hasRatio(0.031))  
 ⊑ArchetypeComponent ⊧ hasComponent.Programme(MovieRental) ⊧  
 AT156\_C11 hasRatio(0.029))  
 ⊑ArchetypeComponent ⊧ hasComponent.Programme(FurnitureStore) ⊧  
 AT156\_C12 hasRatio(0.011))  
 ⊑ArchetypeComponent ⊧ hasComponent.Programme(HardwareStore) ⊧  
 AT156\_C13 hasRatio(0.02))  
 ⊑ArchetypeComponent ⊧ hasComponent.Programme(HomeGoodsStore) ⊧  
 AT156\_C14 hasRatio(0.014))  
 ⊑ArchetypeComponent ⊧ hasComponent.Programme(BicycleStore) ⊧  
 AT156\_C15 hasRatio(0.015))  
 AT156\_C16 ⊑ArchetypeComponent ⊧ hasComponent.Programme(Florist) ⊧ hasRatio(0.027))  
 AT156\_C17 ⊑ArchetypeComponent ⊧ hasComponent.Programme(Unknown) ⊧ hasRatio(0.096))  
 ⊑ArchetypeComponent ⊧ hasComponent.Programme(ElectronicsStore) ⊧  
 AT157\_C1 hasRatio(0.028))  
 ⊑ArchetypeComponent ⊧ hasComponent.Programme(CarDealer/CarRental) ⊧  
 AT157\_C2 hasRatio(0.007))  
 ⊑ArchetypeComponent ⊧ hasComponent.Programme(Restaurant) ⊧  
 AT157\_C3 hasRatio(0.048))  
 AT157\_C4 ⊑ArchetypeComponent ⊧ hasComponent.Programme(BeautyService) ⊧

hasRatio(0.008))  
 AT157\_C5  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Bar/Cafe)  $\nVdash$  hasRatio(0.004))  
 AT157\_C6  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Laundry)  $\nVdash$  hasRatio(0.014))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(ConvenienceStore)  $\nVdash$   
 AT157\_C7 hasRatio(0.014))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(HomeGoodsStore)  $\nVdash$   
 AT157\_C8 hasRatio(0.006))  
 AT157\_C9  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(ArtGallery)  $\nVdash$  hasRatio(0.009))  
 AT157\_C10  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(LiquorStore)  $\nVdash$  hasRatio(0.01))  
 AT157\_C11  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.851))  
 AT158\_C1  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(BookStore)  $\nVdash$  hasRatio(0.01))  
 AT158\_C2  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Lodging)  $\nVdash$  hasRatio(0.059))  
 AT158\_C3  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.93))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Bank/PostOffice)  $\nVdash$   
 AT159\_C1 hasRatio(0.052))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(CarRepair/CarWash)  $\nVdash$   
 AT159\_C2 hasRatio(0.035))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(ElectronicsStore)  $\nVdash$   
 AT159\_C3 hasRatio(0.056))  
 AT159\_C4  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(School)  $\nVdash$  hasRatio(0.047))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(HardwareStore)  $\nVdash$   
 AT159\_C5 hasRatio(0.035))  
 AT159\_C6  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(NightClub)  $\nVdash$  hasRatio(0.033))  
 AT159\_C7  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.742))  
 AT160\_C1  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Gym)  $\nVdash$  hasRatio(0.034))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(ClothingStore/ShoeStore)  $\nVdash$   
 AT160\_C2 hasRatio(0.019))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Restaurant)  $\nVdash$   
 AT160\_C3 hasRatio(0.059))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(BeautyService)  $\nVdash$   
 AT160\_C4 hasRatio(0.106))  
 AT160\_C5  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(School)  $\nVdash$  hasRatio(0.019))  
 AT160\_C6  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Bar/Cafe)  $\nVdash$  hasRatio(0.035))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(DepartmentStore)  $\nVdash$   
 AT160\_C7 hasRatio(0.13))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(ConvenienceStore)  $\nVdash$   
 AT160\_C8 hasRatio(0.011))  
 AT160\_C9  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Florist)  $\nVdash$  hasRatio(0.057))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(JewelryStore)  $\nVdash$   
 AT160\_C10 hasRatio(0.023))  
 AT160\_C11  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Lodging)  $\nVdash$  hasRatio(0.115))  
 AT160\_C12  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Unknown)  $\nVdash$  hasRatio(0.392))  
 AT161\_C1  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Gym)  $\nVdash$  hasRatio(0.014))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(Bank/PostOffice)  $\nVdash$   
 AT161\_C2 hasRatio(0.019))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(ClothingStore/ShoeStore)  $\nVdash$   
 AT161\_C3 hasRatio(0.053))  
 $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(ElectronicsStore)  $\nVdash$   
 AT161\_C4 hasRatio(0.062))  
 AT161\_C5  $\sqsubseteq$  ArchetypeComponent  $\nVdash$  hasComponent.Programme(CarDealer/CarRental)  $\nVdash$



hasRatio(0.004))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Restaurant) ⊧  
 AT161\_C6 hasRatio(0.184))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(HealthService) ⊧  
 AT161\_C7 hasRatio(0.002))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(BeautyService) ⊧  
 AT161\_C8 hasRatio(0.138))  
 AT161\_C9 ⊆ArchetypeComponent ⊧ hasComponent.Programme(School) ⊧ hasRatio(0.034))  
 AT161\_C10 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Bar/Cafe) ⊧ hasRatio(0.028))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(DepartmentStore) ⊧  
 AT161\_C11 hasRatio(0.04))  
 AT161\_C12 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Laundry) ⊧ hasRatio(0.007))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(ConvenienceStore) ⊧  
 AT161\_C13 hasRatio(0.007))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(FurnitureStore) ⊧  
 AT161\_C14 hasRatio(0.016))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(HardwareStore) ⊧  
 AT161\_C15 hasRatio(0.004))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(HomeGoodsStore) ⊧  
 AT161\_C16 hasRatio(0.021))  
 AT161\_C17 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Locksmith) ⊧ hasRatio(0.011))  
 AT161\_C18 ⊆ArchetypeComponent ⊧ hasComponent.Programme(BookStore) ⊧ hasRatio(0.006))  
 AT161\_C19 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Pharmacy) ⊧ hasRatio(0.043))  
 AT161\_C20 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Florist) ⊧ hasRatio(0.006))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(JewelryStore) ⊧  
 AT161\_C21 hasRatio(0.011))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(LiquorStore) ⊧  
 AT161\_C22 hasRatio(0.005))  
 AT161\_C23 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Unknown) ⊧ hasRatio(0.284))  
 AT162\_C1 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Gym) ⊧ hasRatio(0.002))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Bank/PostOffice) ⊧  
 AT162\_C2 hasRatio(0.018))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(ClothingStore/ShoeStore) ⊧  
 AT162\_C3 hasRatio(0.007))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(CarRepair/CarWash) ⊧  
 AT162\_C4 hasRatio(0.001))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(ElectronicsStore) ⊧  
 AT162\_C5 hasRatio(0.004))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(CarDealer/CarRental) ⊧  
 AT162\_C6 hasRatio(0.002))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Restaurant) ⊧  
 AT162\_C7 hasRatio(0.067))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(HealthService) ⊧  
 AT162\_C8 hasRatio(0.001))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(BeautyService) ⊧  
 AT162\_C9 hasRatio(0.028))  
 AT162\_C10 ⊆ArchetypeComponent ⊧ hasComponent.Programme(School) ⊧ hasRatio(0.01))  
 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Bar/Cafe) ⊧  
 AT162\_C11 hasRatio(0.012))  
 AT162\_C12 ⊆ArchetypeComponent ⊧ hasComponent.Programme(Laundry) ⊧ hasRatio(0.008))  
 AT162\_C13 ⊆ArchetypeComponent ⊧ hasComponent.Programme(ConvenienceStore) ⊧

	hasRatio(0.008))
AT162_C14	⊆ArchetypeComponent Γ∖ hasComponent.Programme(FurnitureStore) Γ∖ hasRatio(0.001))
AT162_C15	⊆ArchetypeComponent Γ∖ hasComponent.Programme(HomeGoodsStore) Γ∖ hasRatio(0.003))
AT162_C16	⊆ArchetypeComponent Γ∖ hasComponent.Programme(Pharmacy) Γ∖ hasRatio(0.008))
AT162_C17	⊆ArchetypeComponent Γ∖ hasComponent.Programme(Florist) Γ∖ hasRatio(0.007))
AT162_C18	⊆ArchetypeComponent Γ∖ hasComponent.Programme(JewelryStore) Γ∖ hasRatio(0.004))
AT162_C19	⊆ArchetypeComponent Γ∖ hasComponent.Programme(Lodging) Γ∖ hasRatio(0.04))
AT162_C20	⊆ArchetypeComponent Γ∖ hasComponent.Programme(LiquorStore) Γ∖ hasRatio(0.003))
AT162_C21	⊆ArchetypeComponent Γ∖ hasComponent.Programme(MovieTheater) Γ∖ hasRatio(0.022))
AT162_C22	⊆ArchetypeComponent Γ∖ hasComponent.Programme(Unknown) Γ∖ hasRatio(0.744))
AT163_C1	⊆ArchetypeComponent Γ∖ hasComponent.Programme(Gym) Γ∖ hasRatio(0.003))
AT163_C2	⊆ArchetypeComponent Γ∖ hasComponent.Programme(Bank/PostOffice) Γ∖ hasRatio(0.014))
AT163_C3	⊆ArchetypeComponent Γ∖ hasComponent.Programme(ClothingStore/ShoeStore) Γ∖ hasRatio(0.003))
AT163_C4	⊆ArchetypeComponent Γ∖ hasComponent.Programme(CarDealer/CarRental) Γ∖ hasRatio(0.003))
AT163_C5	⊆ArchetypeComponent Γ∖ hasComponent.Programme(Restaurant) Γ∖ hasRatio(0.033))
AT163_C6	⊆ArchetypeComponent Γ∖ hasComponent.Programme(BeautyService) Γ∖ hasRatio(0.009))
AT163_C7	⊆ArchetypeComponent Γ∖ hasComponent.Programme(Supermarket) Γ∖ hasRatio(0.028))
AT163_C8	⊆ArchetypeComponent Γ∖ hasComponent.Programme(Bar/Cafe) Γ∖ hasRatio(0.007))
AT163_C9	⊆ArchetypeComponent Γ∖ hasComponent.Programme(Florist) Γ∖ hasRatio(0.004))
AT163_C10	⊆ArchetypeComponent Γ∖ hasComponent.Programme(LiquorStore) Γ∖ hasRatio(0.007))
AT163_C11	⊆ArchetypeComponent Γ∖ hasComponent.Programme(Unknown) Γ∖ hasRatio(0.888))

## Section E: Validation

This section describes the three malls used for the validation of the programme profile formulation results: Clementi 321, City Square Mall and Ngee Ann City. The rationale for choosing these particular malls for the validation was four-fold: data was easily available for them; their plots had the same (Commercial) zoning type; they were located on a single plot; and they differed in terms of size, geographical location and programme distribution, thereby increasing the generalisability of the validation. *Table S8* presents information on the location, zoning properties, floor area and Google Place counts for each mall. The comparison also shows differences, which to a large extent can be explained by two factors: particular

establishments with unusual (i.e. non-archetypal) floor areas and outdated Place Type data. For example, 321 Clementi has an unusually large gym spread across two floors, occupying a larger portion of the mall than our model estimated. City Square Mall has less of its GFA dedicated to department stores than estimated by the model, as our Google Place data, on which the model was built, contains two department stores that permanently closed during the four-month period between the Google Maps API data collection and the measurement. The accuracy of the formulated programme profiles may thus improve when using updated Google Place datasets.

Table S8: Characteristics of the malls used for validation

	Takashimaya	321 Clementi	City Square Mall
<b>plot ID</b>	#10282	#10342	#10186
<b>Location</b>	Orchard (Central)	Clementi (Western)	Farrer Park (Central)
<b>Zoning type</b>	Commercial	Commercial	Commercial
<b>Plot GPR</b>	6.3	3	unknown from master plan
<b>Plot size [<math>m^2</math>]</b>	26,865	2,420	11,103
<b>Floor area [<math>m^2</math>]</b>	111,665	5,572	31,517
<b>Programme count</b>	327	39	239

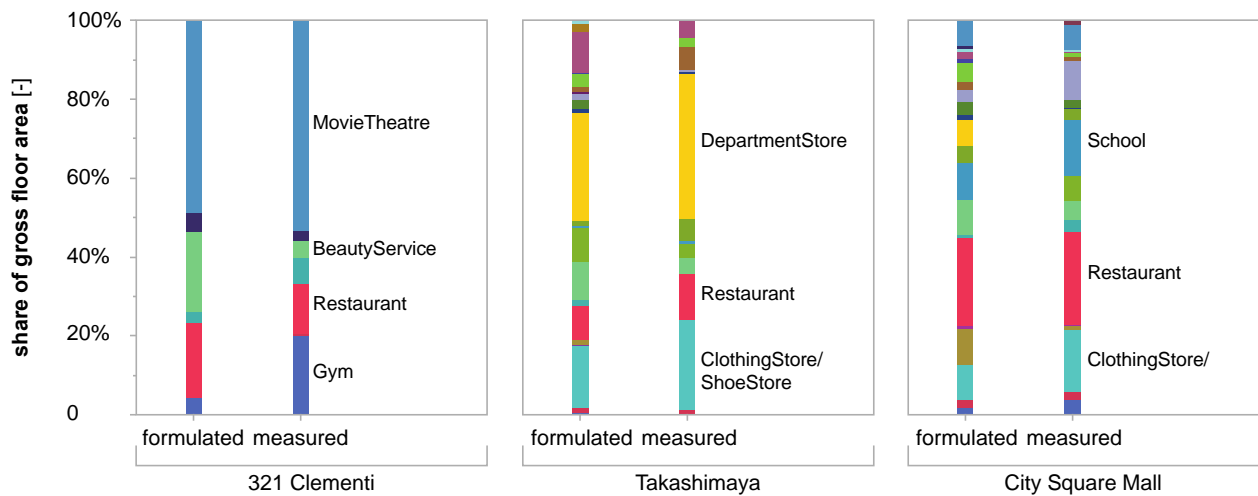


Figure S5. This figure compares formulated programme profiles (left) to empirical measurements (right) for three malls in Singapore. Considering the diversity of mixed-use plots in Singapore, our method produces fairly accurate programme profiles, identifying dominant programme types and their shares of the total floor area. Consult Figure 3 in the main text or the full legend of the colours.

Table S9: A quantitative comparison between the formulated and the measured programme profiles for the three selected malls of validation.

Programme types	Ratios					
	321 Clementi (formulated)	321 Clementi (measured)	Takashimaya (formulated)	Takashimaya (measured)	City Square Mall (formulated)	City Square Mall (measured)
<b>Gym</b>	4.2%	20.1%	0.6%	0.0%	1.7%	3.9%
<b>Bank/PostOffice</b>	0.0%	0.2%	1.1%	1.1%	2.1%	2.0%
<b>ClothingStore/ShoeStore</b>	0.0%	0.0%	15.8%	23.0%	8.9%	15.5%

CarRepair/CarWash	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%
ElectronicsStore	0.0%	0.0%	1.2%	0.0%	9.2%	1.1%
CarDealer/CarRental	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
PetStore/VeterinaryCare	0.0%	0.0%	0.0%	0.0%	0.6%	0.2%
Restaurant	19.2%	12.9%	8.6%	11.5%	22.4%	23.5%
HealthService	2.8%	6.7%	1.7%	0.0%	0.8%	3.2%
BeautyService	20.1%	4.2%	9.4%	4.1%	8.8%	4.7%
Supermarket	0.0%	0.0%	8.7%	3.5%	0.0%	6.4%
School	0.0%	0.0%	0.3%	0.9%	9.5%	14.2%
Bar/cafe	0.0%	0.0%	1.2%	5.5%	4.1%	2.8%
DepartmentStore	0.0%	0.0%	27.6%	36.8%	6.6%	0.0%
Laundry	0.0%	0.0%	0.8%	0.4%	1.1%	0.1%
ConvenienceStore	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%
MovieRental	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
FurnitureStore	0.0%	0.0%	2.3%	0.0%	3.5%	2.2%
HardwareStore	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
HomeGoodsStore	0.0%	0.0%	1.4%	0.6%	3.0%	9.7%
Locksmith	0.0%	0.0%	0.7%	0.1%	0.0%	0.0%
BookStore	0.0%	0.0%	1.1%	5.9%	2.1%	1.2%
Pharmacy	0.0%	0.0%	3.4%	2.2%	4.8%	0.8%
BicycleStore	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Florist	0.0%	0.0%	0.3%	0.0%	1.0%	0.0%
JewelryStore	0.0%	0.0%	10.2%	4.3%	1.8%	0.5%
Lodging	0.0%	0.0%	2.0%	0.0%	0.0%	0.0%
ArtGallery	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%
LiquorStore	0.0%	0.0%	0.6%	0.2%	0.8%	0.3%
NightClub	4.9%	2.6%	0.2%	0.0%	0.7%	0.0%
Museum	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Embassy	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Library	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
MovieTheater	48.8%	53.3%	0.0%	0.0%	6.6%	6.4%
Casino	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
BowlingAlley	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%

## Section F: A case study

### Case study's plot and its context

We chose a commercial plot with a GPR of 4.2 located close to Singapore's central business district. The plot, shown in Figure S6, is the site of a heritage railway station and the Cantonment MRT (mass rapid transit) station, which is currently under construction. This plot was chosen as it reflects and represents a trend of transit-oriented mixed-use development of Singapore in an age of fast MRT system expansion.

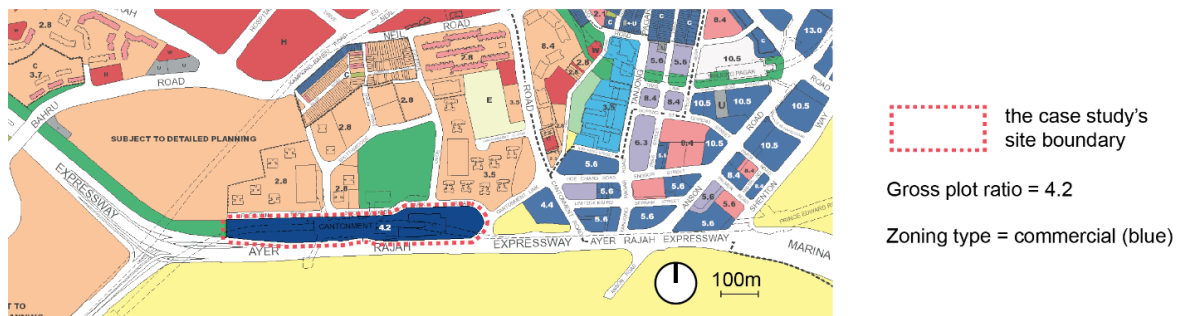


Figure S6. Our case study plot (marked with a dashed red line) is the site of a heritage railway station and the future Cantonment MRT station. The base image shows the Singapore Master Plan 2019 (Urban Redevelopment Authority, 2019).

We populated the plot with a proposed building geometry and programme, representing a potential new development on the site for which we want to forecast the energy demand and on-site photovoltaic (PV) electricity yields; this is illustrated in Figure S7 (a). To do this, we set up an UBEM simulation using the City Energy Analyst (CEA). UBEM simulations require building geometries and programmes as input. The buildings' forms (e.g. site coverage, number of towers and their footprint area) were determined based on a recent survey of high-density mixed-use urban forms in Singapore (Shi et al., 2021), and the geometry was scaled to reach the target GPR of 4.2. The buildings were then assigned the programme profile of a mixed-use archetype that met the following two criteria: a commercial zoning type and a GPR of ~4.2. Figure S7 (b) illustrates the programme profile of Archetype #54, which is the only archetype that meets both criteria. The geometry and the programmes are used as inputs for UBEM simulations.

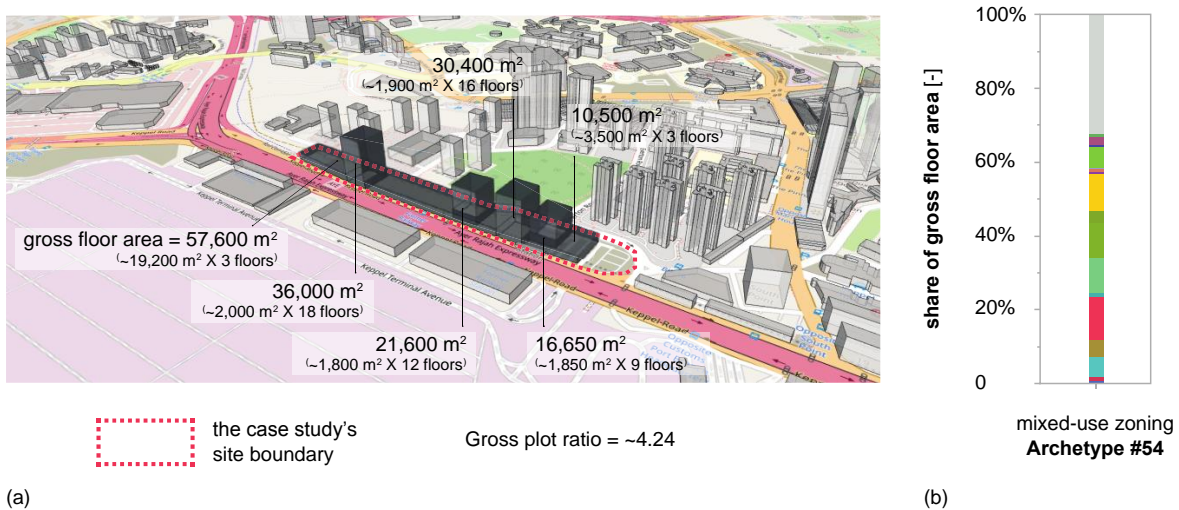


Figure S7. (a) We added a potential new development to our case study site, with built volumes representing six buildings; (b) The building volumes are assigned the programme profile of Archetype #54. See Figure 3 in the main text for a legend of the programme colours.

## Urban building energy analysis

In this step, we modelled, simulated, and assessed the energy system of our proposed new development. Specifically, we executed UBEM simulations and conducted analyses assessing cooling supply system designs for the case study. The UBEM simulations were executed using the City Energy Analyst (CEA), an open-source Python-based toolbox capable of simulating urban solar radiation, forecasting building energy demand and designing thermal energy supply systems. All simulations in this work use CEA Version 3.4 (The CEA team, 2020). The building energy demand simulations of CEA use an hourly resistance-capacitance model (Mosteiro-Romero et al., 2020). The solar heat gain calculations of CEA use DAYSIM (MIT Sustainable Design Lab, 2020), a validated software that considers the mutual shading between building geometries. The infiltration airflow simulations of CEA uses a constant envelope leakage rate (Fonseca et al., 2016).

The basic inputs for the CEA energy demand forecast are building geometries including both the target buildings and the surrounding contexts in shapefile format, building occupancy profiles as well as building construction and system properties. In our analysis, we used as

inputs the building geometries shown in Figure S7 (a) with the ones in black as target buildings and the ones in white as the surrounding contexts. Occupancy profiles were derived from the buildings' programme profiles, shown in Figure S7 (a), using occupancy schedules adapted from the ASHRAE (the American Society of Heating, Refrigerating and Air-Conditioning Engineers) standards. The building construction and system properties are pre-defined in the CEA database for Singapore. Based on these inputs, the CEA energy demand forecast calculates the hourly electricity demand for lighting and appliances and thermal energy demand for space cooling and water heating.

We modelled a commonly-used centralised cooling supply system in Singapore. Our simulation determines the size and the cost-effectiveness of the chillers. A measure for the cost-effectiveness is the chiller's Capacity Factor ( $CF$ ), which measures to what extent the chillers are used to their maximum installed capacity - as chillers represent the largest overall expense in a cooling supply system, engineers aim to maximise their cost-effectiveness. The  $CF$  is calculated as

$$CF = \frac{\sum_{t=1}^{8,760} D_{qc}(t)}{QC_{ch} \times 8,760h} \quad (\text{Equation 7})$$

where  $t$  represents all hourly time steps in a year,  $D_{qc}$  is the plot's hourly cooling demand in [ $kWh$ ], and  $QC_{ch}$  is the chiller's installed capacity in [ $kW$ ]. CEA determines the installed size of the chillers based on the plot's peak cooling demand. Using CEA, the building energy demand forecast, PV electricity yield calculation as well as the cooling supply design and simulation in the cast study takes approximately 8 minutes. The specifications of the computer used to execute the simulation is: LENOVO ThinkPad P14s, Intel Core i7-10510U CPU@1.80Ghz, RAM 32GB.

## Comparison

To what extent does using our data-informed programme archetypes impact the energy simulation results in comparison to conventional inputs? To answer this question, we ran the simulations again using CEA's default use profile (i.e., retail use only) for a whole commercial site. This retail use also most closely matched the programme profile used in our data-informed simulation (i.e., Archetype #54, consisting mainly of the programmes department\_store and apparel\_store). The results of the simulations are listed in Table S10. This comparison shows that using archetypes as an input has a significant effect on all the major outputs of our energy simulations, especially the peak cooling and final electricity demands, which are important for the design of both the PV and centralised cooling supply systems. In the Discussion Section, we discuss the impact of an archetype-based simulation.

*Table S10: The CEA simulation results for the case study when using archetype programme profiles and when using conventional (retail) use types.*

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<b>Metrics</b> [ <i>unit</i> ]	<b>using Archetype #54 programme profile</b>	<b>using conventional (retail) use type</b>

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annual final electricity demand [MWh]	~51,683	~54,595
annual cooling demand [MWh]	~75,616	~60,365
peak hourly cooling demand [MWh]	~23	~17
installed annual chiller capacity [MWh]	~202,110	~148,114
chiller capacity factor [-]	~37%	~41%

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