



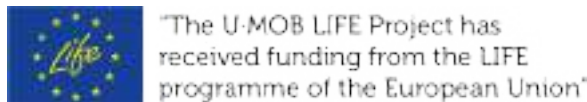
## III European Conference on Sustainable Mobility at Universities

---

# Data-based understanding and optimization of sustainability of university mobility: two case studies

Andrea Scagni and Micol Maggiolini

University of Torino



"The U-MOB LIFE Project has received funding from the LIFE programme of the European Union"

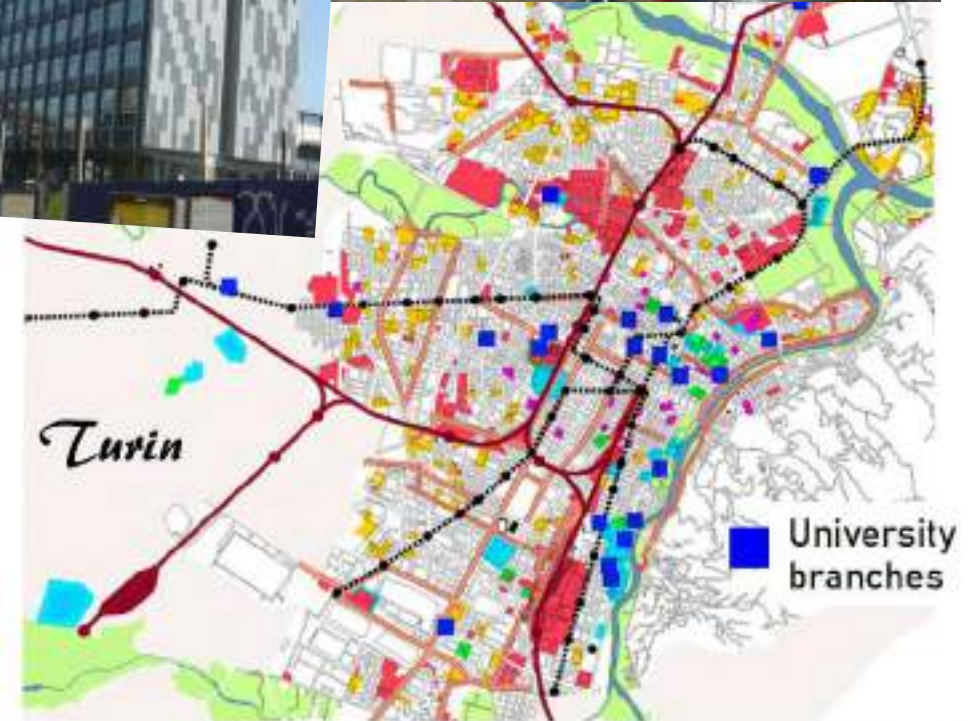


UNIVERSITÀ  
DEGLI STUDI  
DI BERGAMO

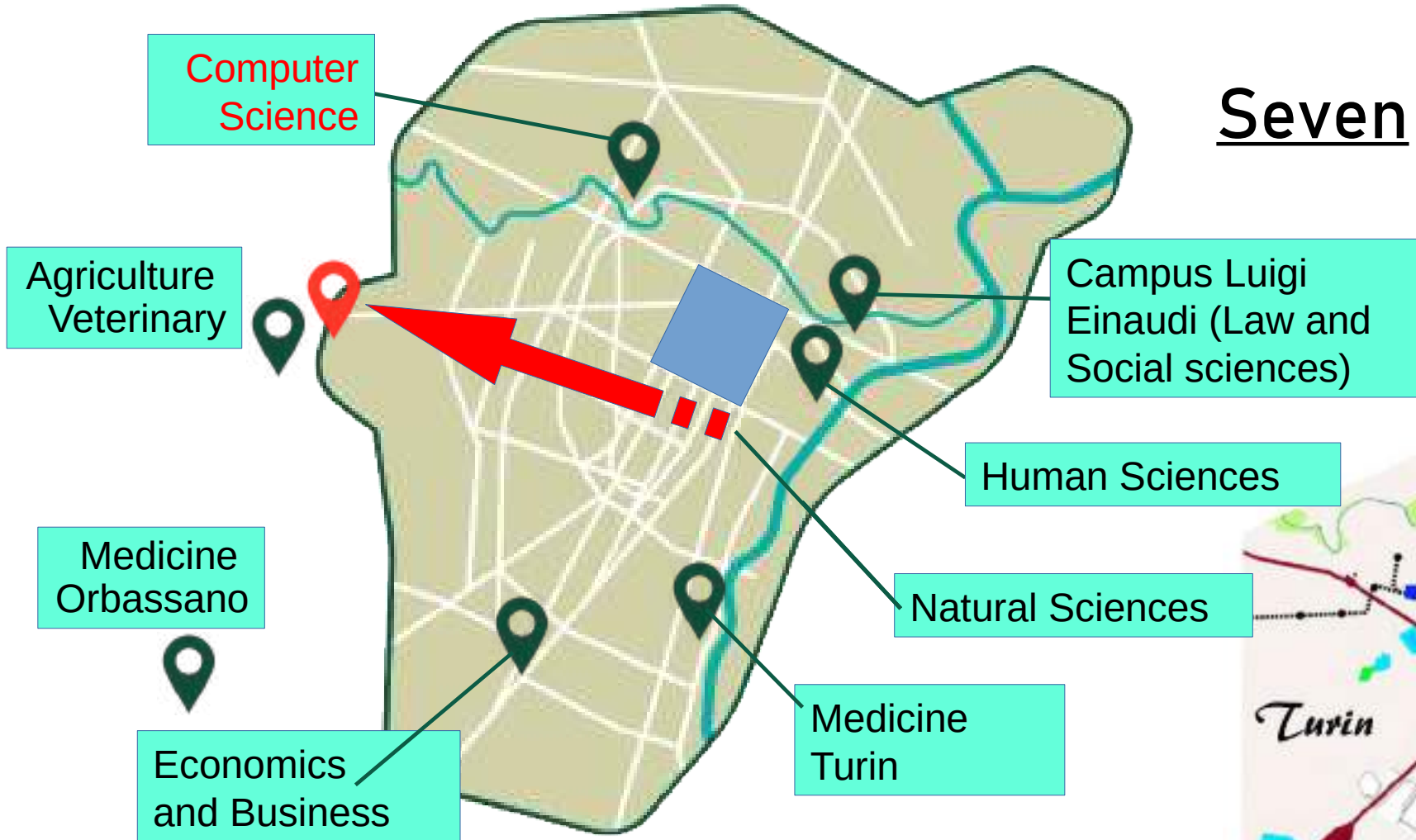


## UniTo - the University of Turin

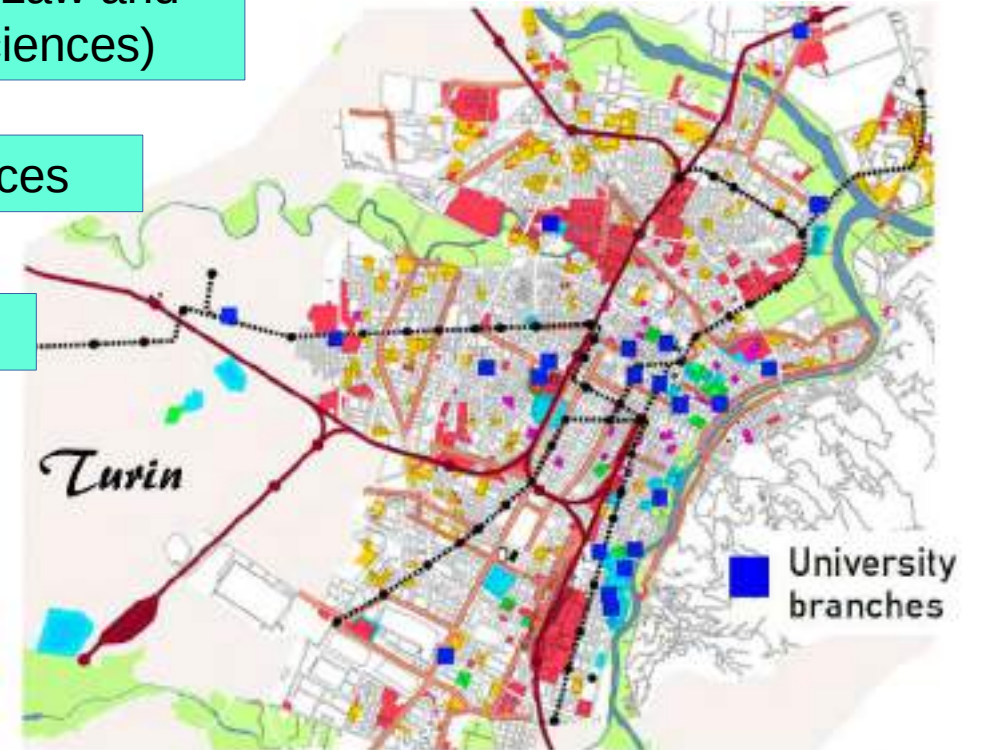
- A large, mega-atheneum with a sparse structure, about 120 branches in different locations around the city (and the suburbs)
- Its daily activities induce a significant part of the Turin metropolitan area mobility
- With a community of around **85.000**, distances covered every single day are way above **100.000 kms**.





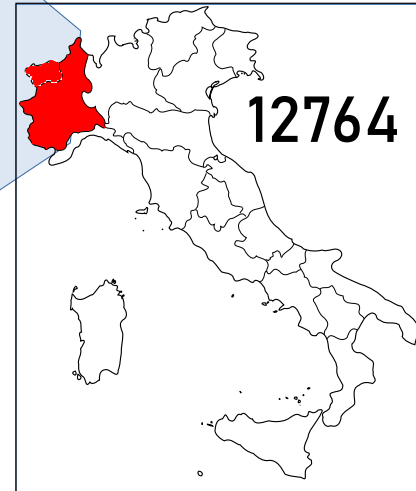
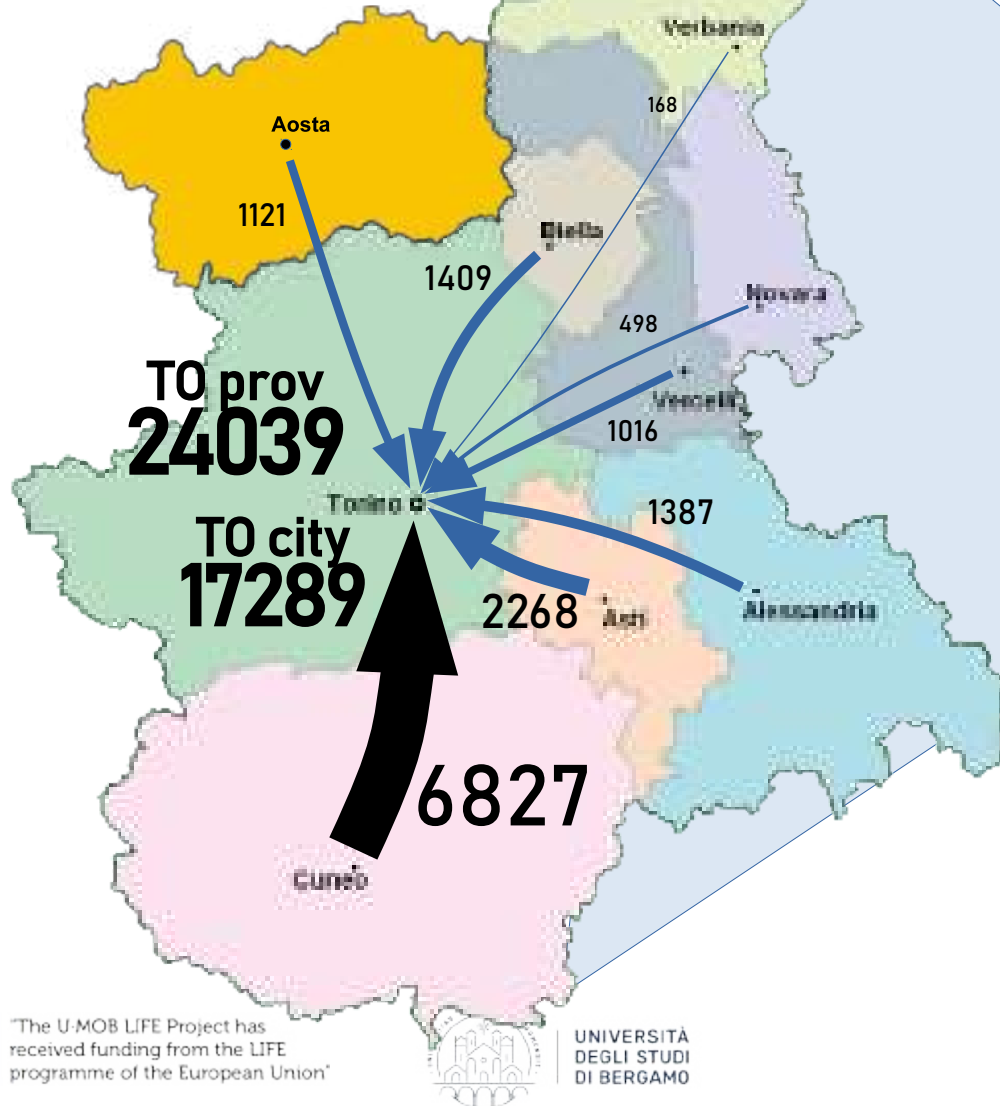


## Seven main campuses



# Coming from where?

## Origin - destination matrix (pre-Covid)



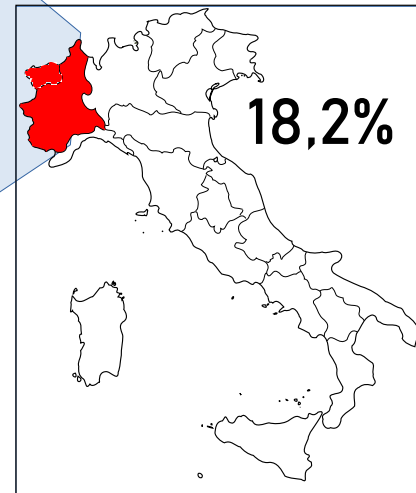
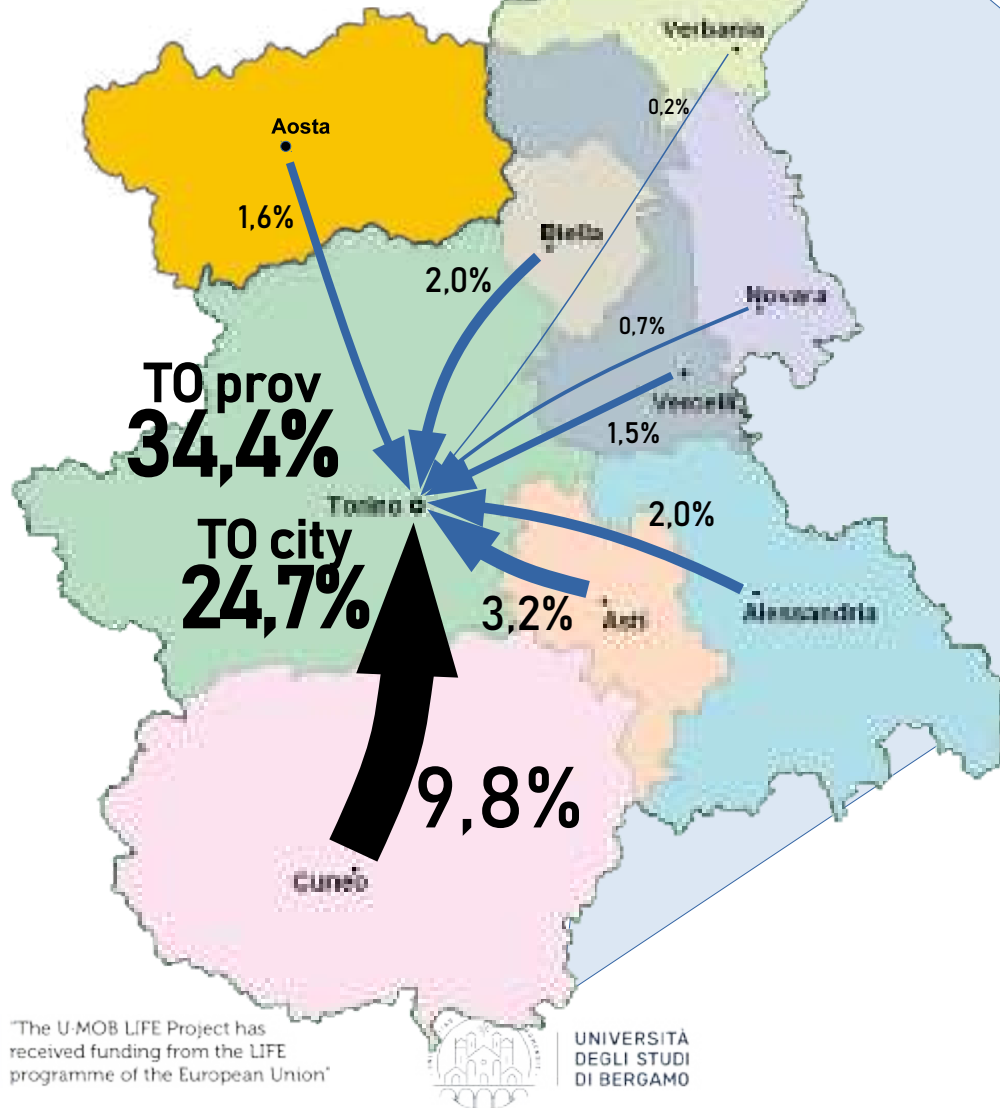
Italy excl. Piedmont



Foreign countries 1157

# Coming from where?

## Origin - destination matrix (pre-Covid)



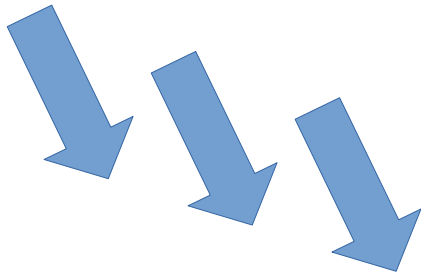
Italy excl. Piedmont



Foreign countries 1,7%

## UniToGO - *Sustainable mobility working group*

- The main goal is to build cultural, normative and structural conditions that can motivate the members of the UniTo community to change their mobility choices towards sustainability



The *Modal share* of home-to-work and home-to-school should increase for:

- ♦ *active mobility* (walking & cycling)
- ♦ Regional and local public transport (road and rail)
- ♦ Standard or emerging forms of *sharing mobility*





## TWO CASE STUDIES

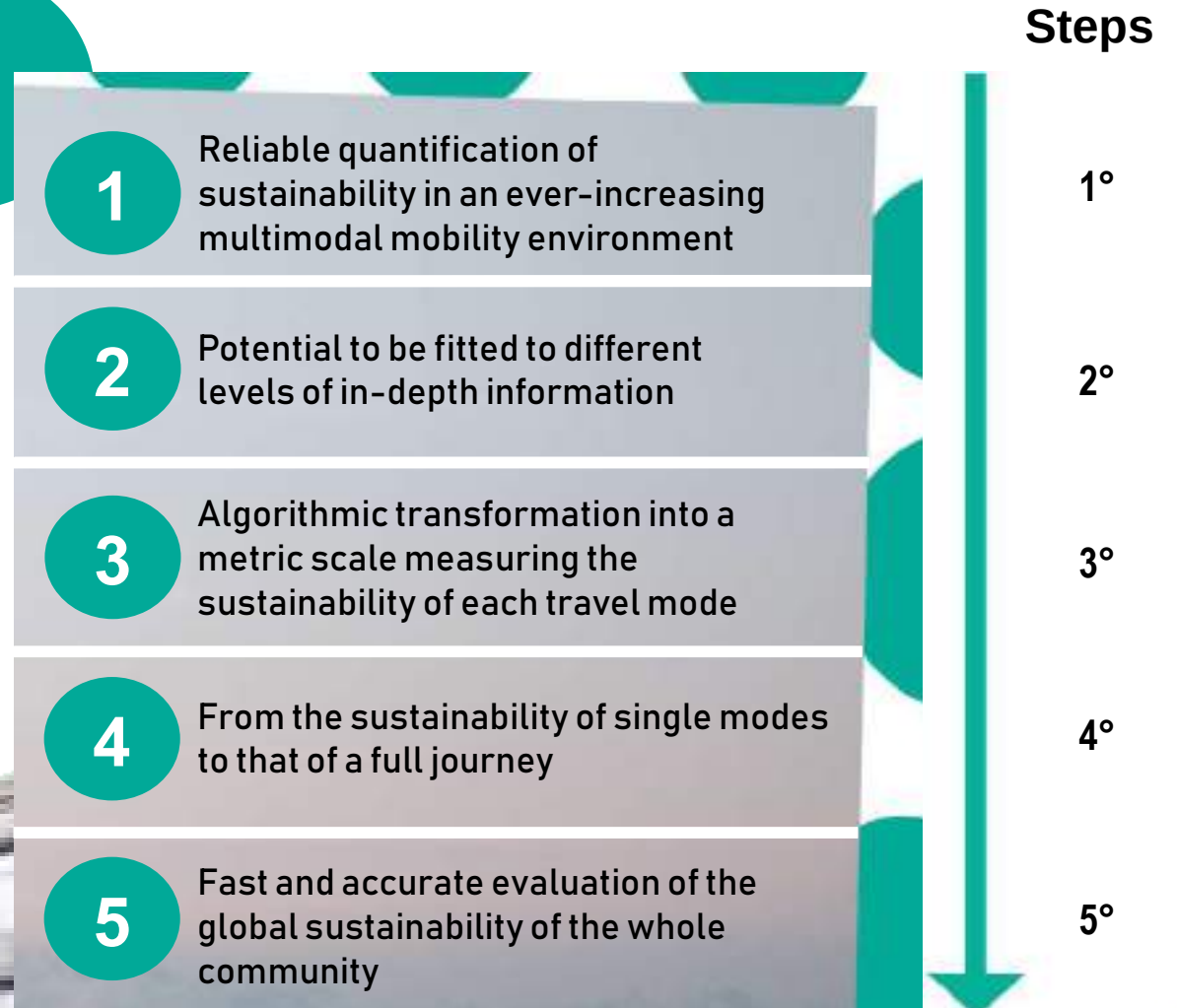
- ◆ Understanding better how sustainable are mobility choices in a complex urban environment
  - Developing a **TAXONOMY** of sustainability of mobility choices
- ◆ **Efficiently increasing the attractiveness** of more sustainable mobility modes to our community
  - Directly engaging the community to define the best ways to promote sharing mobility



## Developing a TAXONOMY of sustainability of mobility choices



The precise evaluation of the level of sustainability involved by the commuting behaviour of a vast and heterogeneous set of individuals is clearly useful in the process of mobility monitoring and managing for a large scale community.





## Investigating the mobility of university communities in Italy

**2016** - First national survey on university mobility



**2021** - National survey "University mobility in the age of Covid-19"



## Mobility choices and sustainability

### Classification of sustainability 2016

1. **Fully sustainable**

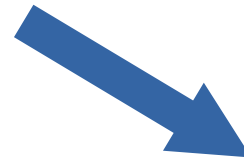
All commuting done with *active mobility*, *public transport*, *sharing* or any combination of the above

2. **Partially sustainable**

Multimodal journeys made using *private motorized transport*, but in combination with other modes

3. **Not sustainable**

Journeys made exclusively using private motorized transport



### Active

### Semi-active



Walking

Cycling

E-bike

E-scooter

### ISSUES:

- not considering how many passengers on car
- not considering the engine type
- no distinction between cars and motorcycles
- not considering how long is the car section in multimodal journeys
- no distinction between active and *semi-active* mobility

## ...What are the main factors affecting sustainability?

In no particular order, for surface transport modes:

- ◆ Direct air pollution
- ◆ Carbon footprint
- ◆ Size of vehicle
- ◆ Weight of vehicle
- ◆ Noise
- ◆ Ownership status (private, pooled or shared)
- ◆ Use of scarce raw materials for vehicle construction
- ◆ Disposal or recycling of hazardous waste from discontinued vehicles
- *Health and safety???*
  - *risk of causing accidents involving damage to others*
  - *fitness induced by active mobility*

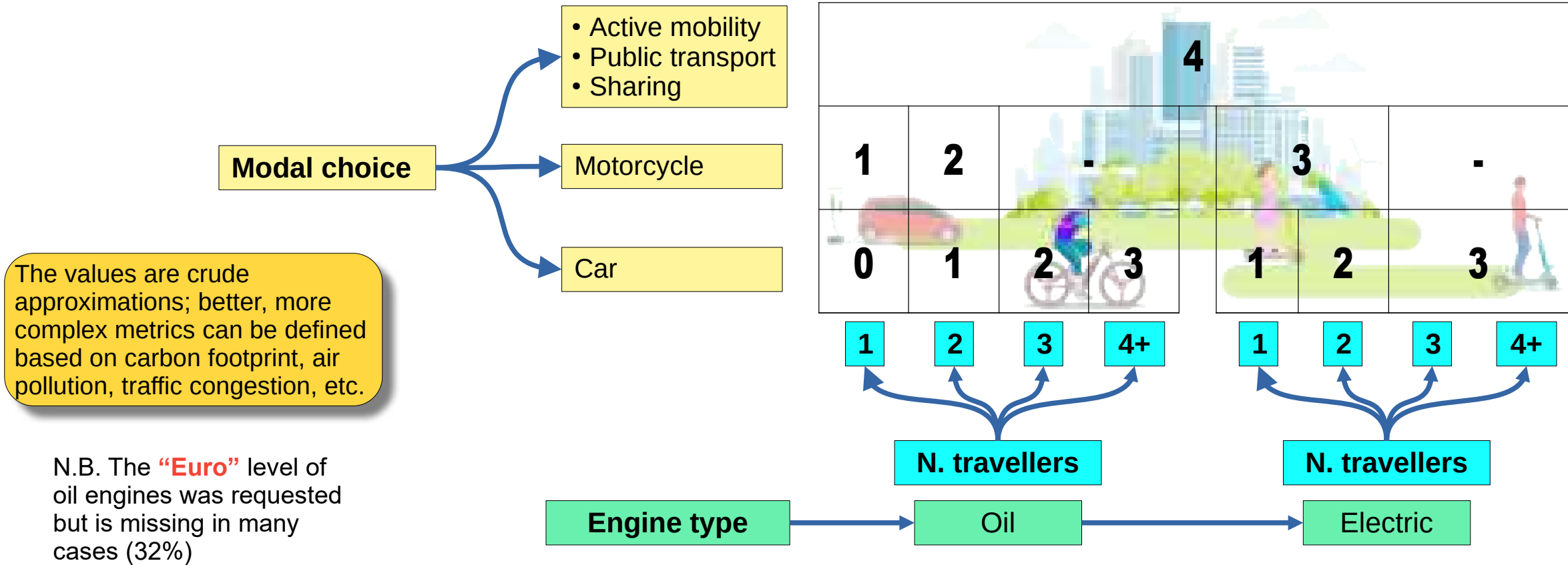


- *All have to be considered **per capita**, i.e. relative to the number of people moved by the vehicle*
- *The **size** of a vehicle (inducing possible traffic congestion and use of parking space) could be related to the density of the human environment of the area where it is travelling*
- *All items have to be checked for data availability and level of detail*



# Towards a better sustainability classification: *a first, raw effort based on the 2020 survey*

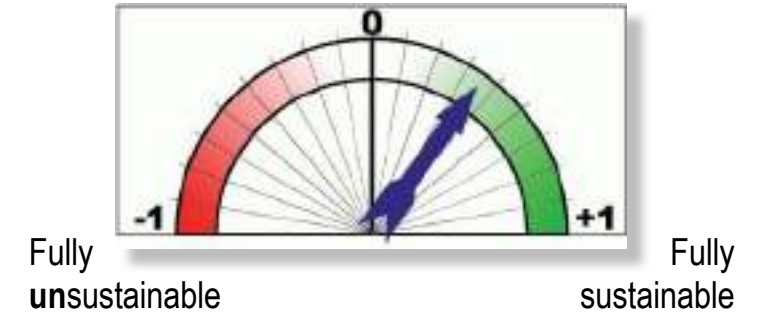
Let's start from the definition of the single modal section



## Towards a better sustainability classification

### Sustainability of the whole journey

- if **uni**modal → the sustainability level of the only section
- if **multi**modal → averaging the points attributed to each section, with possible weighting based on section duration, distance or at least giving more importance to the prevailing mode



Simplified sustainability classification (2016 survey)				
Average sustainability	Not sustainable	Partially sustainable	Fully sustainable	Total
0 - 0,5	15.400	95	102	15.597
0,5 - 1,5	4.286	1.508	913	6.707
1,5 - 2,5	1.550	643	686	2.879
2,5 - 3,5	910	5.939	2.243	9.092
3,5 - 4	0	640	78.329	78.969
<b>Total</b>	<b>22.146</b>	<b>8.825</b>	<b>82.273</b>	<b>113.244</b>

The example of sustainability index takes values between

- 0 (fully unsustainable) and
- 4 (maximum sustainability)

can be easily transformed into a **normalised sustainability coefficient**

## Main mode in commuting to university

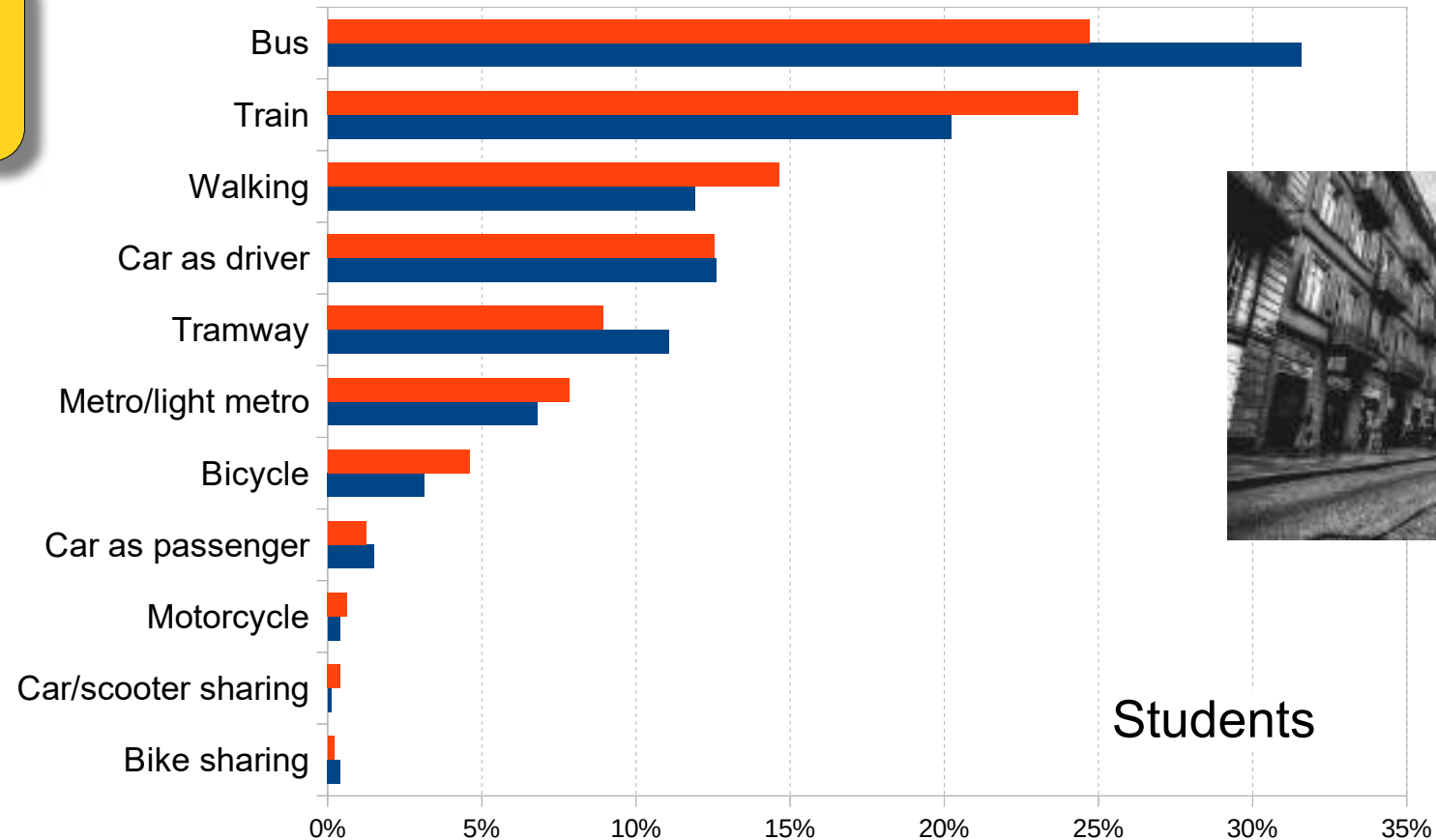
(longest distance covered in the whole journey)

◆ Quite low (**0,78%**) modal share of all **sharing options**, even considering ALL uses (not only as prevailing mode)



**How to significantly increase the use sharing??**

■ % 2016 survey  
■ % 2020 survey (pre-Covid)



Students



## Incentives to sustainable mobility through agreements with sharing service providers



The University of Turin is launching a participatory process to deliver to its community a wide range of extra benefits on the purchase of **sustainable mobility services** (as, but not limited to, bike and scooter sharing services)



2021

1

Review of sustainable mobility services active in the area

April

2

Public notice inviting operators in the sustainable mobility sector to propose agreements

May

3

**Analysis of the received proposals and collection of the university community related preferences through a survey**

June - July

4

Analysis of the survey results; meeting with operators to define agreements details

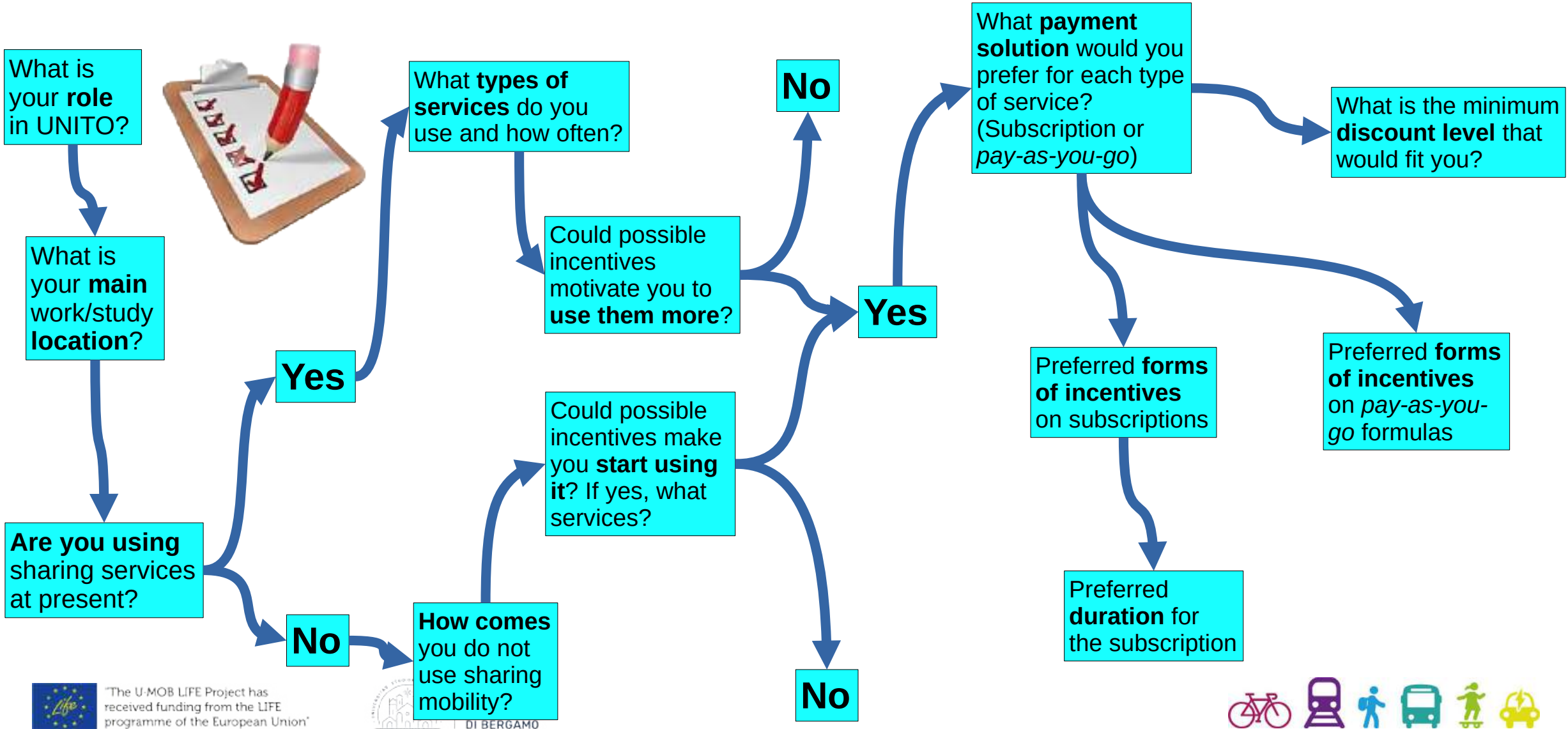
September

5

Final evaluation by the Mobility Manager and UniTo-GO and signing of agreements

October

# Survey structure



## Survey profile

Target	The whole university community, but particularly: <ul style="list-style-type: none"> <li>• Those already using sharing services</li> <li>• The part of the community not using but potentially interested</li> </ul>
Methodology	Self-administered online questionnaire <b>June-July 2021</b>
Sample	<b>3938</b> responses (students <b>86%</b> ; faculty <b>7%</b> ; staff <b>7%</b> )


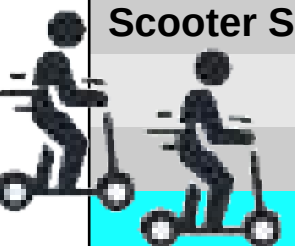



### Are you already using sharing mobility services?

	No, never tried them	No, but I have tried them	Yes	Total
Student	54,7%	25,5%	19,7%	100,0%
Faculty	46,1%	<b>28,0%</b>	<b>25,8%</b>	100,0%
Staff	59,4%	19,1%	21,5%	100,0%
Total	54,5%	25,2%	20,3%	100,0%



# Who is using what?

		I <i>do not</i> use it	I use it from time to time	I use it <i>often</i>	
	<b>Bike Sharing</b>				
	Students	65,4%	25,9%	<b>8,8%</b>	100%
	Faculty	63,6%	25,7%	<b>10,7%</b>	100%
	Staff	54,8%	37,9%	<b>7,3%</b>	100%
	<b>Total</b>	<b>64,4%</b>	<b>26,8%</b>	<b>8,8%</b>	<b>100%</b>
	<b>Scooter Sharing</b>				
	Students	43,5%	37,5%	<b>19,0%</b>	100%
	Faculty	80,0%	12,9%	<b>7,1%</b>	100%
	Staff	67,7%	24,2%	<b>8,1%</b>	100%
	<b>Total</b>	<b>48,6%</b>	<b>34,3%</b>	<b>17,1%</b>	<b>100%</b>
	<b>Car sharing</b>				
	Students	36,3%	39,9%	<b>23,8%</b>	100%
	Faculty	28,6%	58,6%	<b>12,9%</b>	100%
	Staff	40,3%	48,4%	<b>11,3%</b>	100%
	<b>Total</b>	<b>35,9%</b>	<b>42,2%</b>	<b>21,9%</b>	<b>100%</b>

How many service types are used by a person?	%
<b>only one</b> type of service	<b>29,5%</b>
<b>2</b> types of service	<b>35,9%</b>
<b>3</b> “ “	<b>22,8%</b>
<b>4</b> “ “	<b>9,0%</b>
<b>5</b> “ “	<b>2,8%</b>



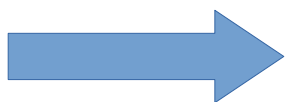
## Are you interested in obtaining facilitations?



### People already using sharing services

Would significant incentives offered to the UNITO community motivate you to use sharing services even more than at present?

	No	Yes	Total
Student	0,7%	<b>99,3%</b>	100%
Faculty	1,4%	<b>98,6%</b>	100%
Staff	3,2%	<b>96,8%</b>	100%
Total	1,0%	99,0%	100%



### People not yet using sharing services

Would significant incentives offered to the UNITO community motivate you to start using sharing services?

	No	Yes	Total
Student	5,6%	<b>94,4%</b>	100%
Faculty	10,9%	89,1%	100%
Staff	14,6%	85,4%	100%
Total	6,6%	93,4%	100%

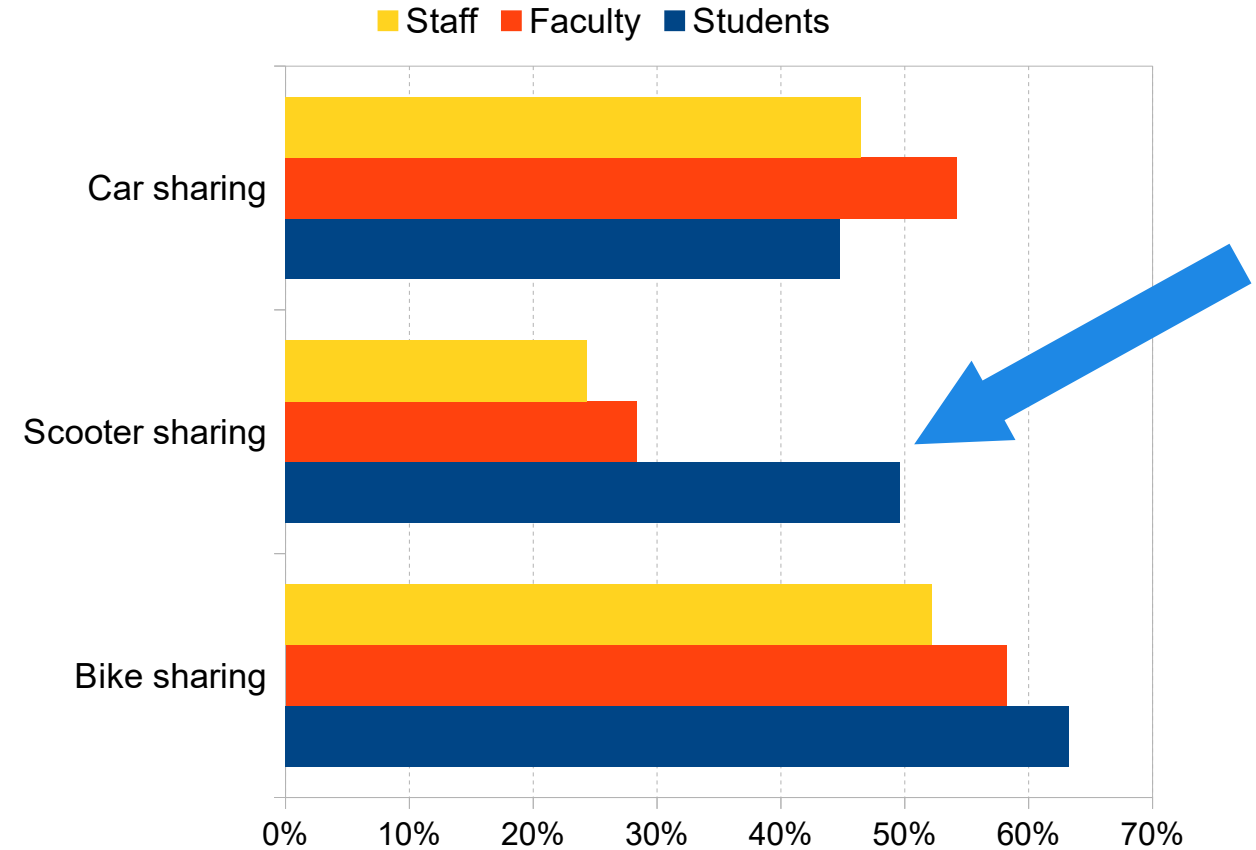
# With the incentives I could start using...

## Multiple choices

Bike			<b>20,4%</b>
Bike	Scooter		<b>19,9%</b>
		car	<b>15,7%</b>
Bike	Scooter	car	<b>14,6%</b>
Bike	monopattino	car	<b>13,0%</b>
Bike	Scooter	car	<b>10,0%</b>
Bike	Scooter	car	<b>6,4%</b>
<b>62,2%</b>	<b>46,4%</b>	<b>45,5%</b>	<b>100%</b>



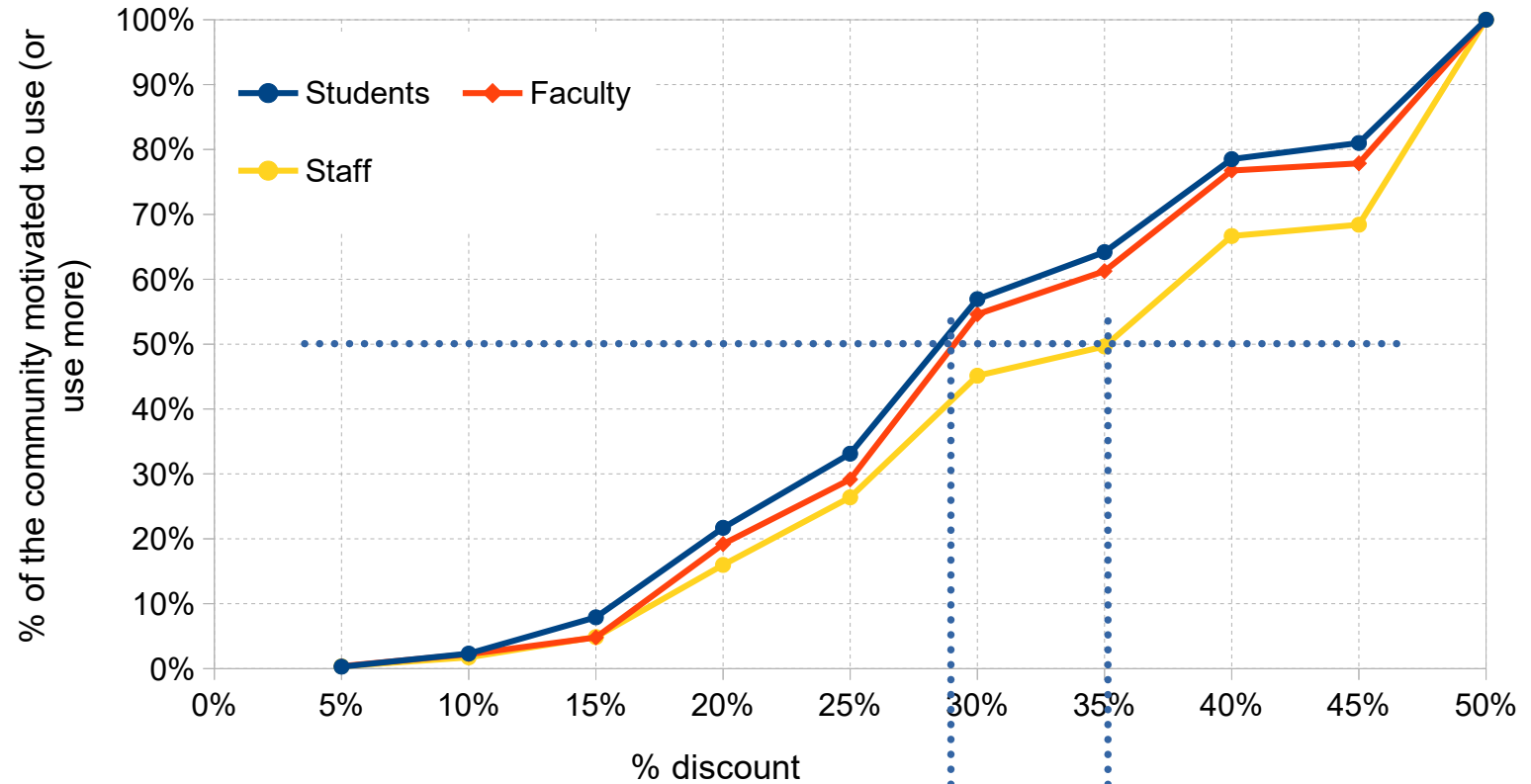
## By group



# Looking for a bargain

*What is the minimum discount to the present-day market prices that could motivate you to use the sharing services?*

- Given the significant prices of many sharing services, very few think a discount of less than **20%** would be enough
- The university staff has a lower elasticity to the price than students and faculty



Engaging 50% of the **students** requires prices 28,5% lower

Engaging 50% of the **staff** requires prices 35% lower





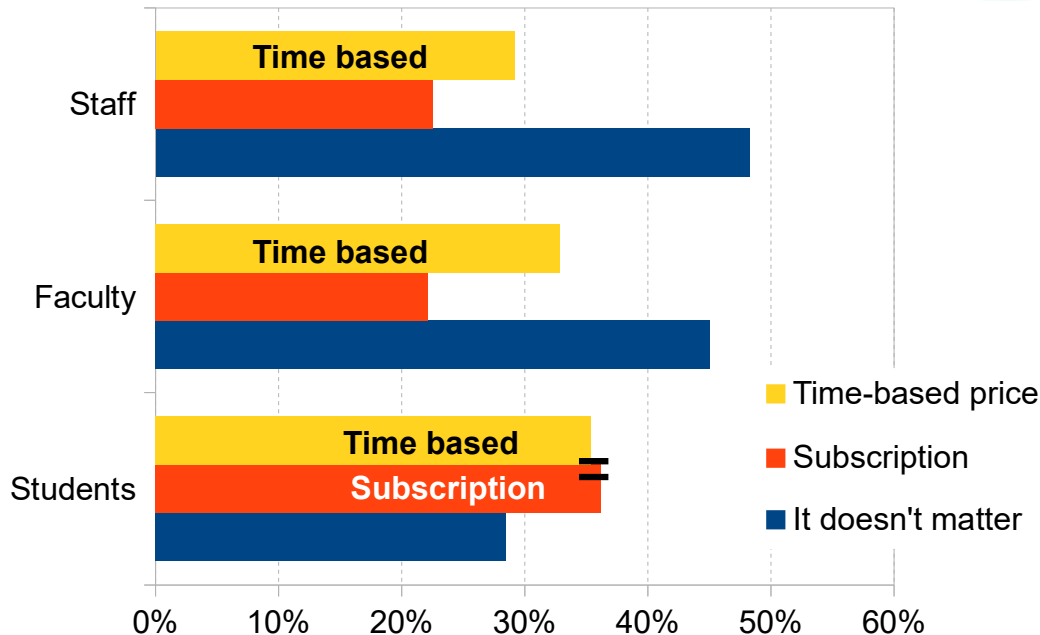
# The best pricing scheme?

The pricing scheme **can come in various solutions:**

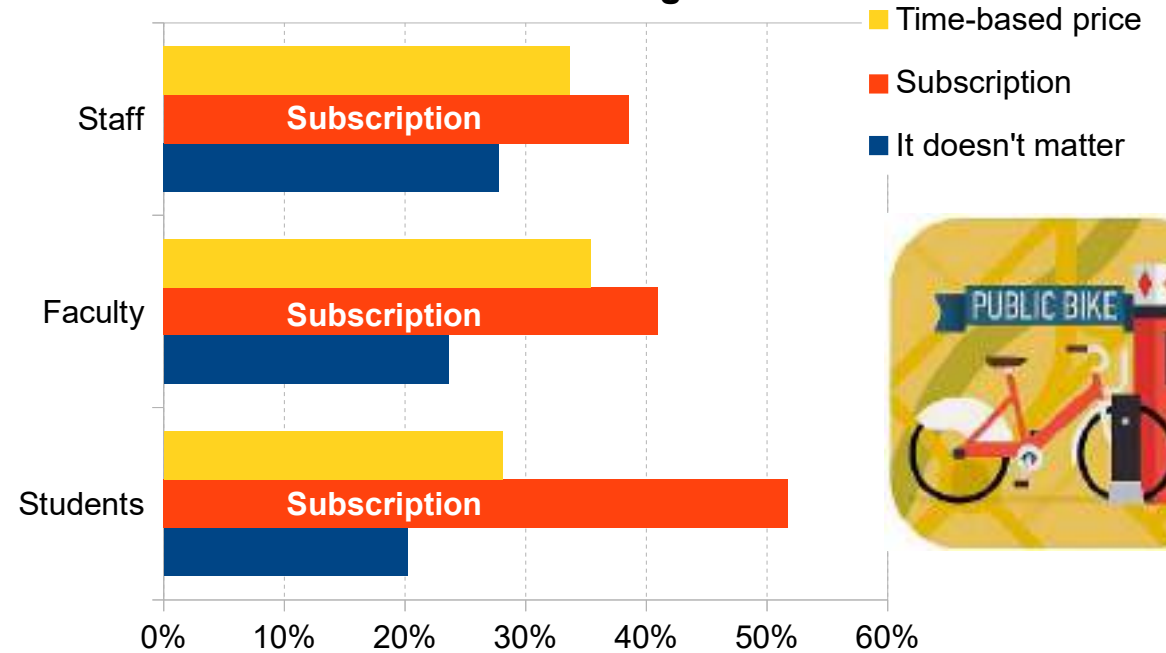
- subscription (with a certain duration)
- fixed price for each run
- a price based on duration of the run
- a fixed starting fee + time-based price
- others



## Scooter sharing



## Bike sharing



*What pricing scheme you like the most for each type of service?*



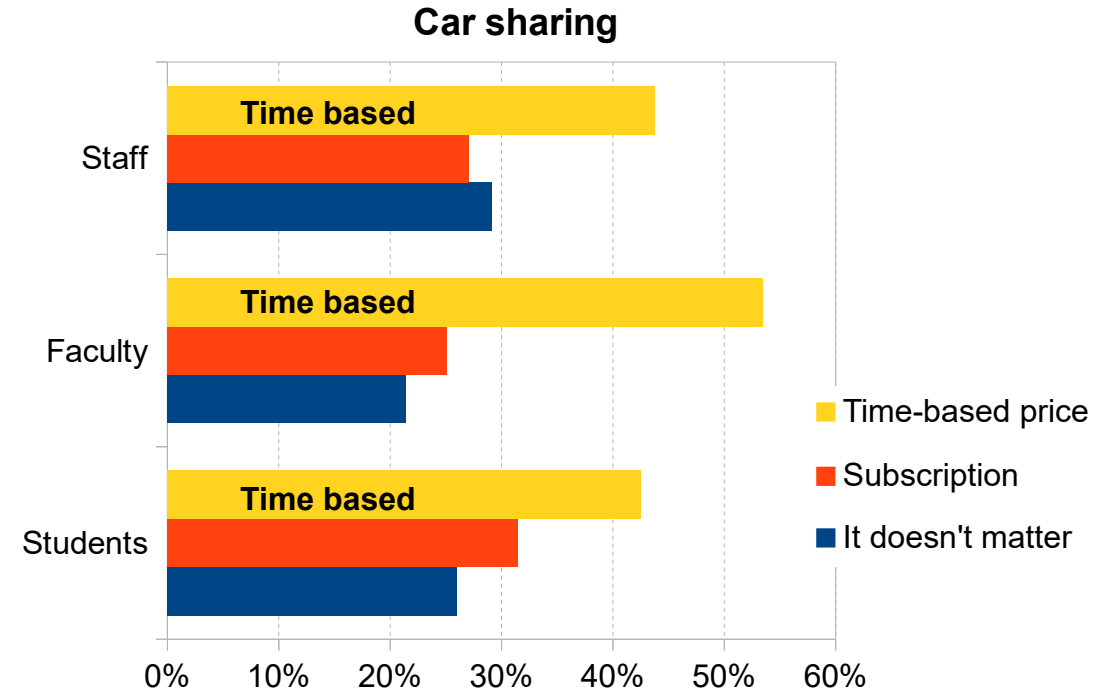
# The best pricing scheme?

*What pricing scheme you like the most for each type of service?*



## Best subscription duration

	Students	Faculty	Staff
Daily	13,3%	7,0%	13,2%
Weekly	19,4%	14,0%	11,1%
Monthly	<b>41,9%</b>	35,1%	32,6%
Seasonal/yearly	25,3%	<b>43,9%</b>	<b>43,1%</b>
Total	100%	100%	100%





THANK YOU!



"The U-MOB LIFE Project has received funding from the LIFE programme of the European Union"



UNIVERSITÀ  
DEGLI STUDI  
DI BERGAMO

