REGINNA 4.0

# A case study of the application of Tourism 4.0 technology in Odesa, Ukraine

Paul Goriup

NGO Agricola, Odesa, Ukraine

www.reginna4-0.eu

A little bit about Odesa

- Founded by Tatars around 1240 as a small fishing settlement, Odesa was incorporated in Tsarist Russia in 1794 after the defeat of the Ottoman Turks

- Established under a Charter from Catherine the Great, the city was planned and built by Renaissance architects, military officers, traders and a multitude of labourers: Ukrainians, Jews, Greeks, Bulgarians, Romanians, Italians, French, British, Germans, Poles, Armenians …. But remaining under Russian governance
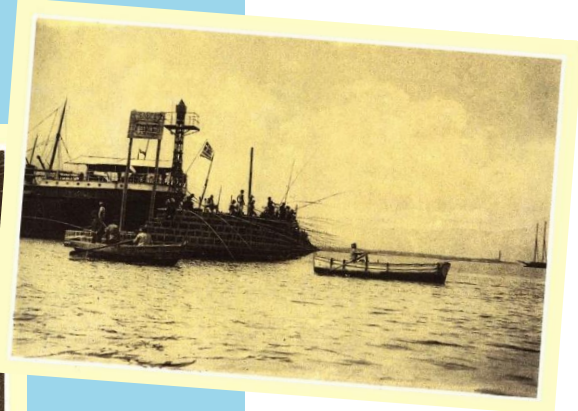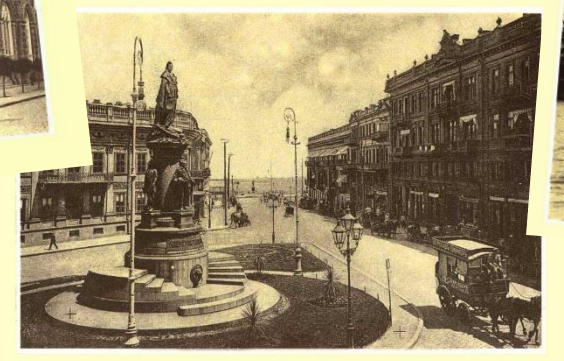
A little bit about Odesa

- Thanks to the rich agricultural hinterland and access to the Black Sea, Odesa became (and remains) the largest maritime settlement on the Black Sea coast (over 1 million inhabitants) and one the wealthiest cities in the Empire and later the Soviet Union

- This heritage and wealth conferred a unique cosmopolitan culture on the city with a great variety of private mansions and palaces, public buildings, institutions and a thriving artistic community. Combining all this with a temperate climate and beaches made Odesa a top tourist destination, known as "pearl of the Black Sea", during the 20th century up to the 2010s.

- Since then, the Russian annexation of Crimea in 2014, impact of COVID-19 from 2020 to 2022 and then the Russian invasion in 2023 have had a severe impact on the tourism sector in the city, and of course the whole of modern Ukraine.

REGINNA
4.0

Co-creating tourism for the future with data analytics 2019 – 2021 (EMFF)
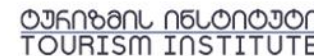
Two data-driven components discussed in this presentation

1. Big data analytics to profile the tourist sector in and around Odesa city

2. Assessment of impacts (positive and negative) affecting the environmental, social and economic sustainability of Odesa city through development of a Tourism Impact Model (TIM)

Big data analytics

Data Analytics performed on the tourism-related data for Odesa and adjacent resorts obtained in collaboration with the Department of Culture and Tourism of Odessa city from

- Booking.com
- TripAdvisor
- Skyscanner
- KyivStar mobile phone data

Analysis tool – Microsoft Power BI

The tool used in this data analysis was Microsoft's Power BI (business intelligence). It provides multiple tools for interactive visualizations and can connect to a wide range of data sets and clean the data in a way that it can be better digested and understood. Power BI allowed us to interactively run reports and elicit insights of the presented tourism data about Odesa.
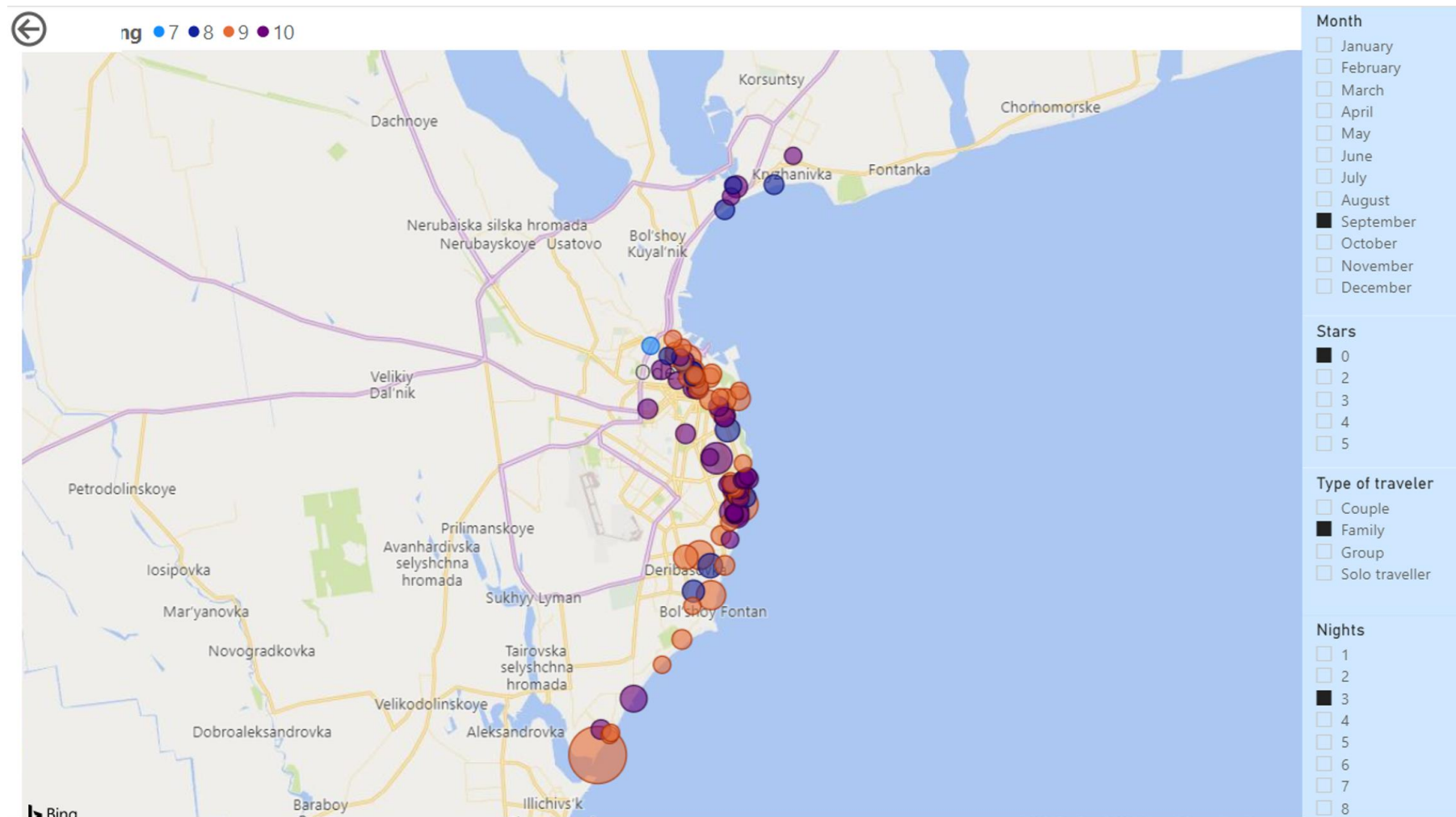
Booking.com data

Booking.com is an online agency for making accommodation reservations with providers such as hoteliers and private apartment owners. Because Booking.com displays search results with filter options that are selected by visitors, much information is gathered from every user (guest and service provider). Guests can also leave feedback of their booking and travel experience through written comments, rating stars, and other quality ratings.

The data structure compiled was an excel table with rows for each guest rating and columns with different attributes linked with this rating. The information extracted from the website had the following attributes for about 90,000 guest rows:

- hotel data (hotel name, address, hotel rating (1-10), hotel rating average),

- location data (district name, geo-location with longitude and latitude, distance to the city center in meters, location rating average),

- guest data (nationality, type of guest (group, family, couple, solo traveler),

- guest accommodation data (room type, check-in date and time, number of nights spent),

- guest rating data (given hotel rating score, date of rating).

Booking.com data filtered for accommodation ratings given by families in September

Booking.com data filtered to show nationality of guests staying in 5 star hotels in August
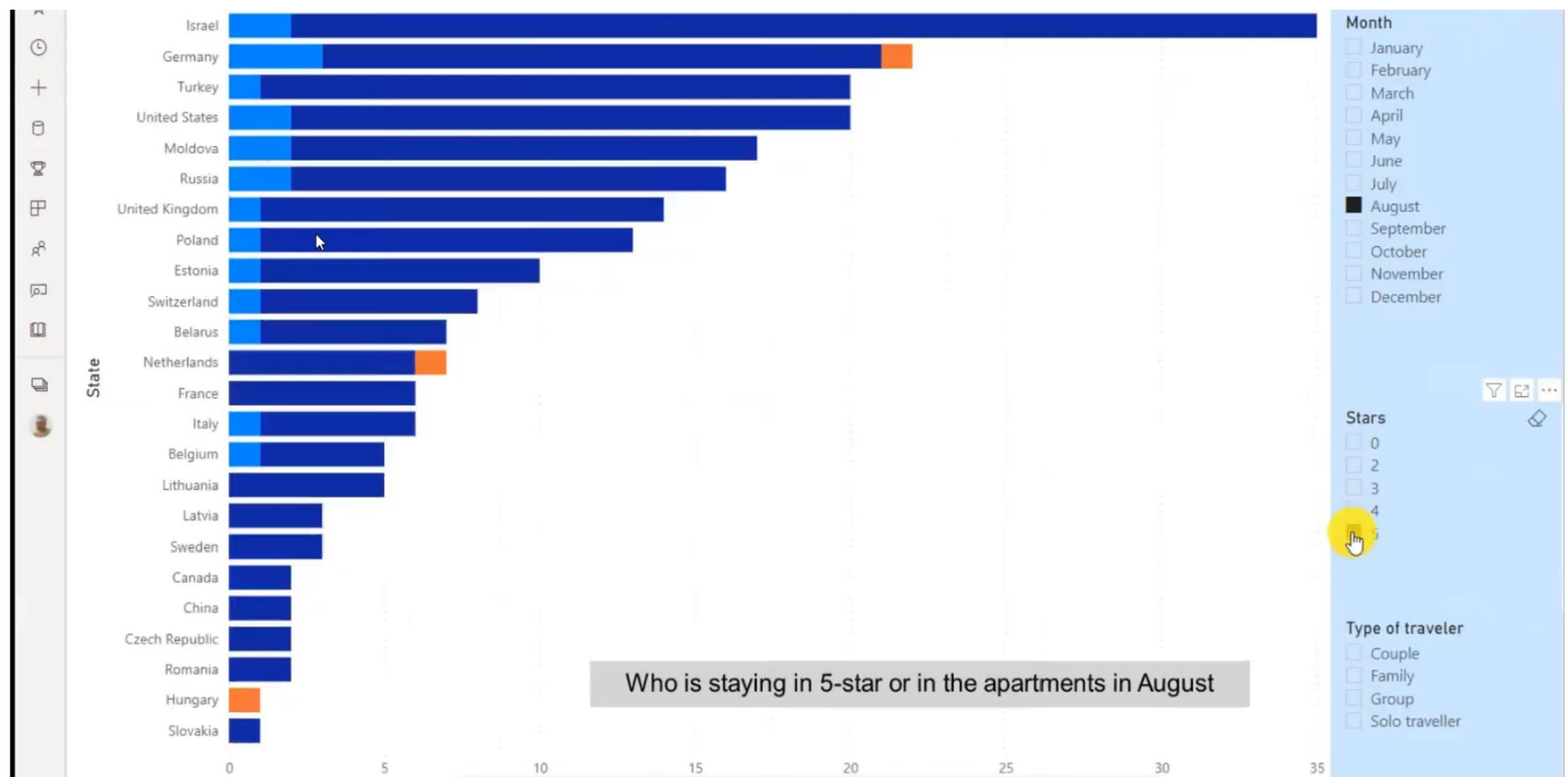

Figure 15: : Bar chart for guest scores separated according to different nationalities of foreign guests. The data is filtered for the August visitors that stayed in five-star hotels. The majority of these guests comes from Israel, Germany, Turkey, and the United States.

TripAdvisor data

TripAdvisor displays user-generated content and has a comparison-shopping website that offers online travel services. Users can leave comments and/or quality ratings of tourist attractions, events, locations, restaurants, stores, accommodations, etc.

The data structure of the information collected about Odesa from TripAdvisor was again an excel table with about 14,000 rows for individual ratings and columns with different attributes linked with each rating. The information had the following attributes for each user input row:

- location data (location name, geo-location with longitude and latitude, all location's scores, location rating average),

- user data (user »name«, date of location experience),

- user rating data (given location rating score (1-5), date of rating).

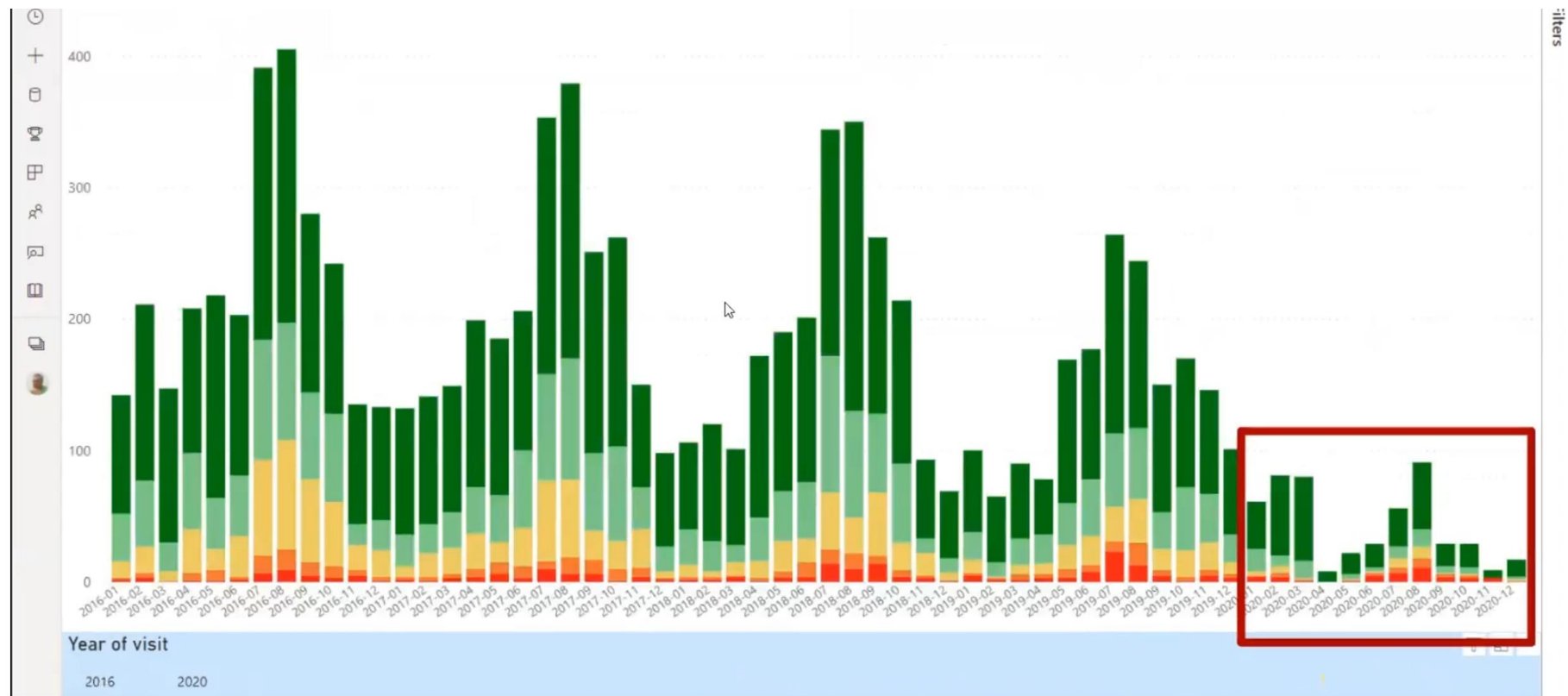# Number of monthly ratings posted to TripAdvisor from 2016 to 2020

Figure 22: The histogram of number of user ratings with bins separated for each month, from January 2016 to December 2020. The number of experience rating dynamic is seasonal with peaks in the months of July and August. The proportions of the rating scores do not change across the months. Over the years, the number of guests steadily declined, and then, drastically fell in the April of 2020 (marked with the red square on the right side).

Experiences in Odesa rated on TripAdvisor

Reviewed experiences (TripAdvisor)

Review rate ●1 ●2 ●3 ●4 ●5
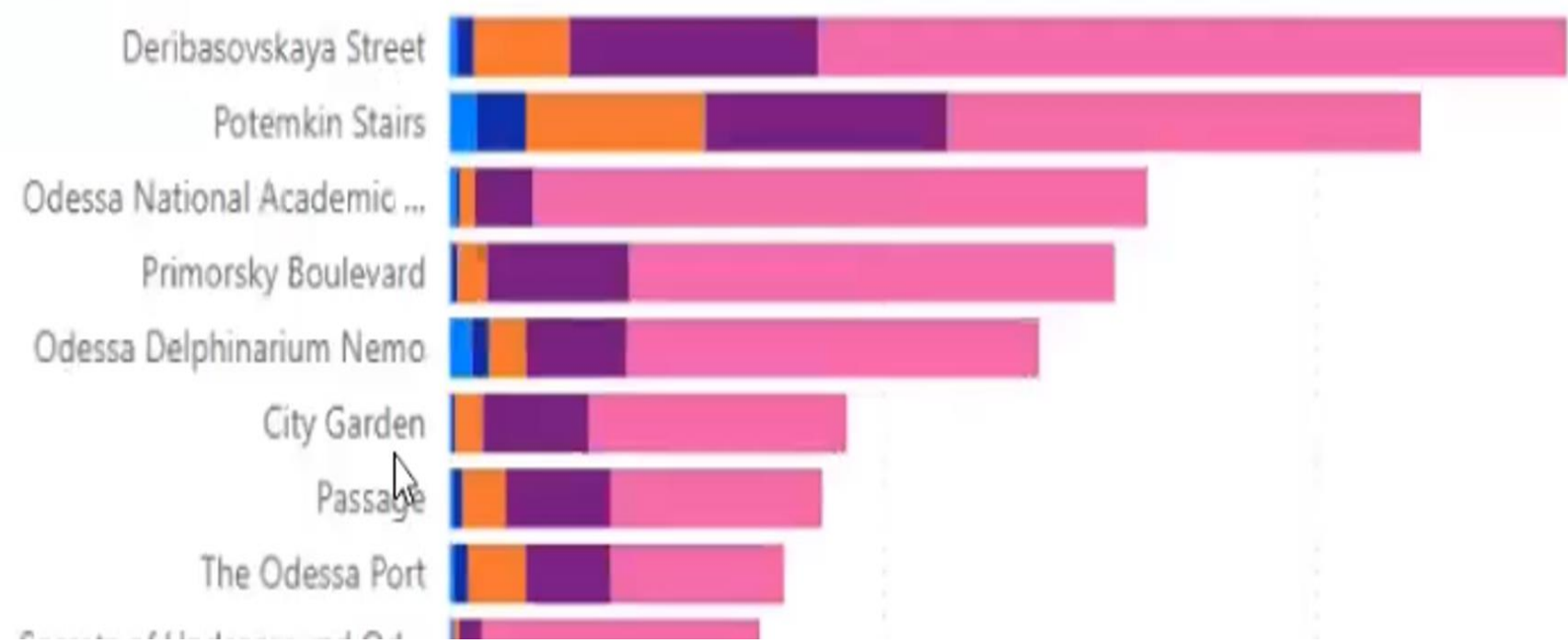
Skyscanner.com

Skyscanner is a highly popular air travel booking site. We collected data on the searches and bookings of flights from foreign countries to Odesa airport. This allowed us to chart from where people flying to Odessa originated.

REGINNA

4.0

# Skyscanner – popular flight searches from airports to Odesa

Mobile data

In order to get a more detailed picture of daily (and even hourly) tourist flow in Odesa we purchased anonymized data from one of the biggest Ukrainian mobile providers.

The data came in several files/data tables that have input rows for each anonymized mobile phone user. Table columns had various attributes linked with each user. All of the data files contained information about the location and time of a mobile user, while other information was specific for each file. The files were of different sizes that spanned from about 200.000 to more than 12,000,000 inputs:

- location data (area and region name, geo-location with longitude and latitude),
- time data (event date, event time, number of days of stay),
- user's data (nationality, age interval, income standard, gender).

Mobile data – where visitors mostly come from
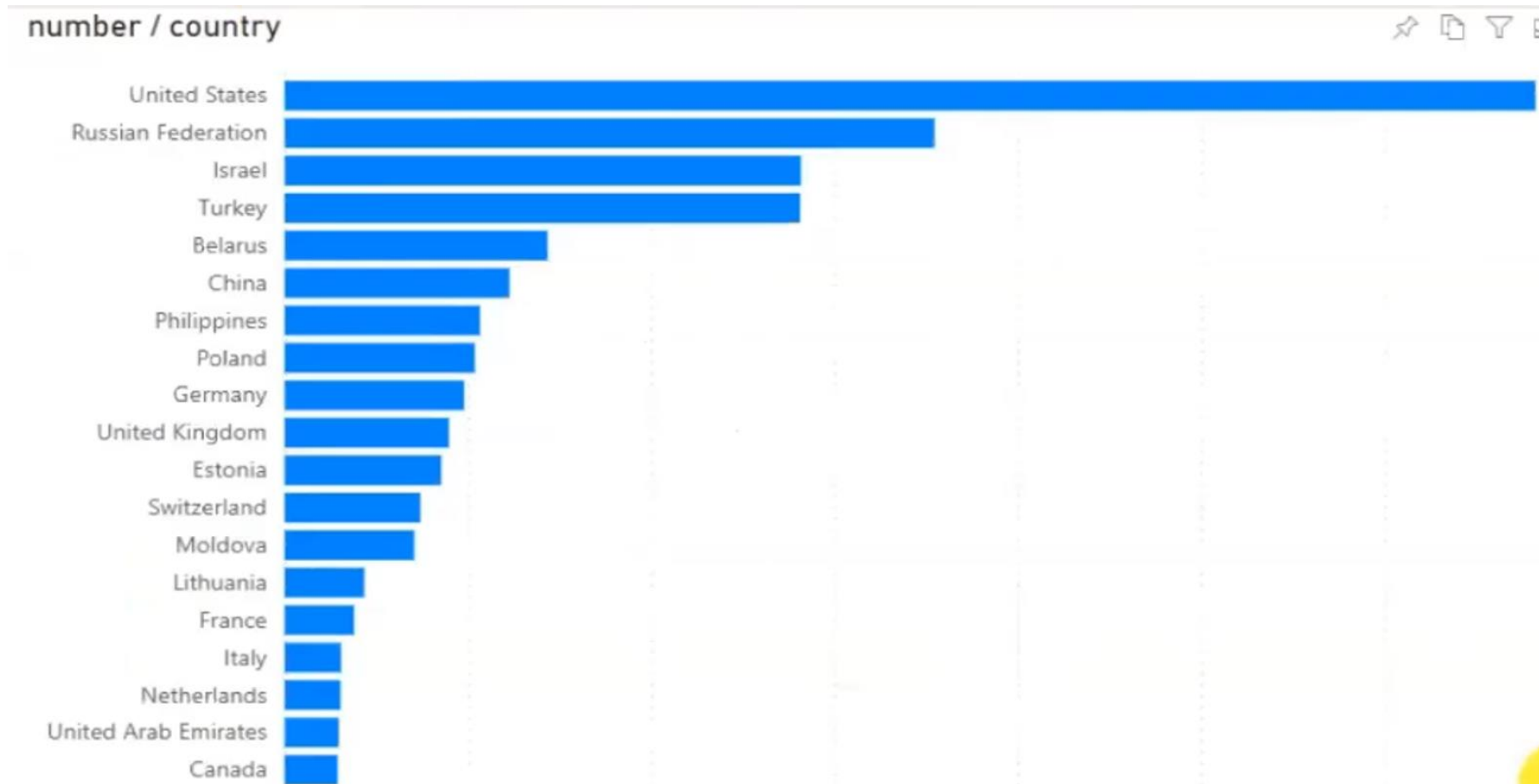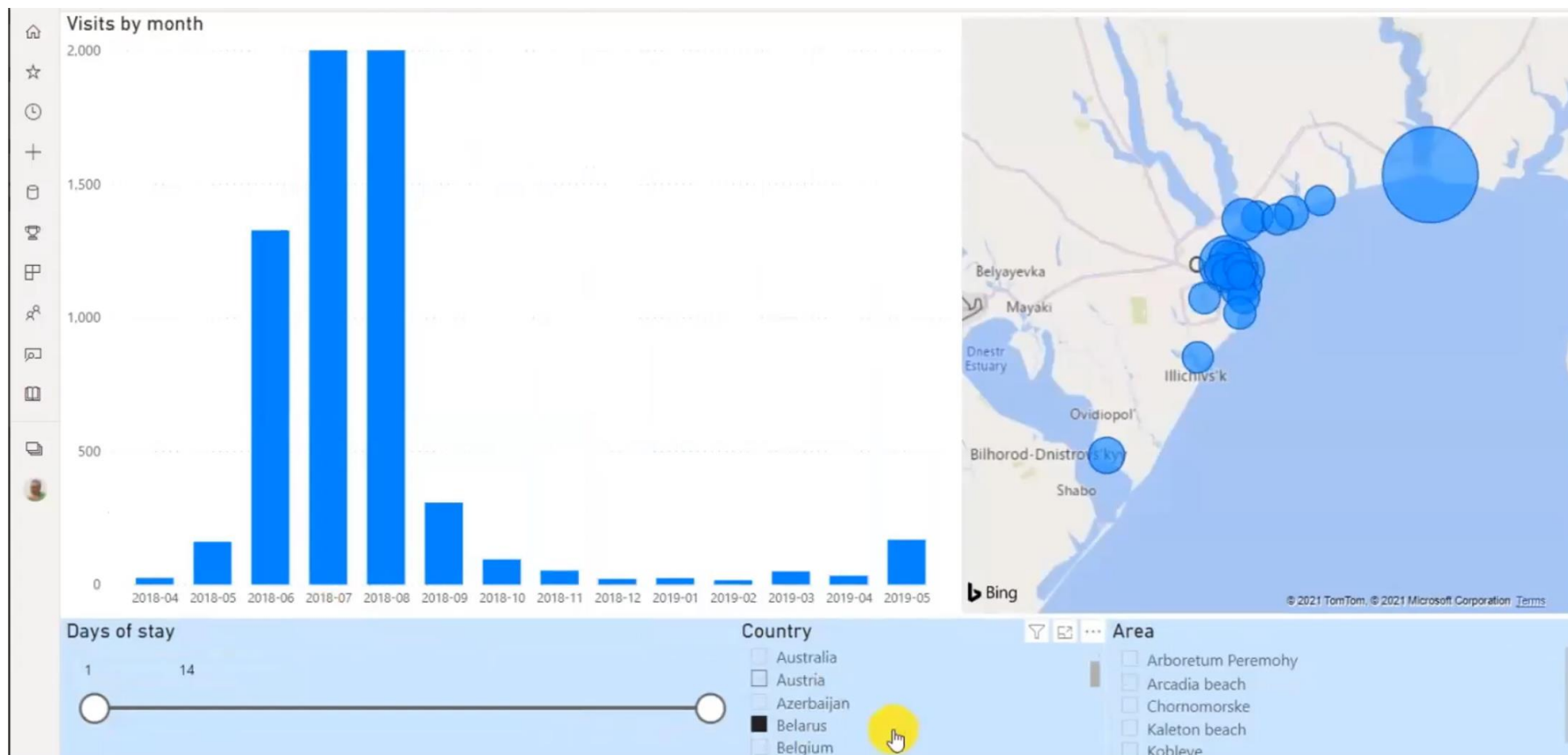
Mobile data – who is going where, when

Figure 39: The bar chart on the left shows a distribution of Belarus tourists over the months through one year period. They are a seasonal tourist that stays in Odessa mostly in months of June, July and August. The map of Odessa is marked with circles for locations where the tourists stayed during their visit to Odessa. The size of the circle represents the number of people at that place. The biggest circle seen on the map marks Kobleve.

Practice with Excel 3D Maps (ecological example)

Any excel table with spatial data can be easily mapped and filtered in 3D maps
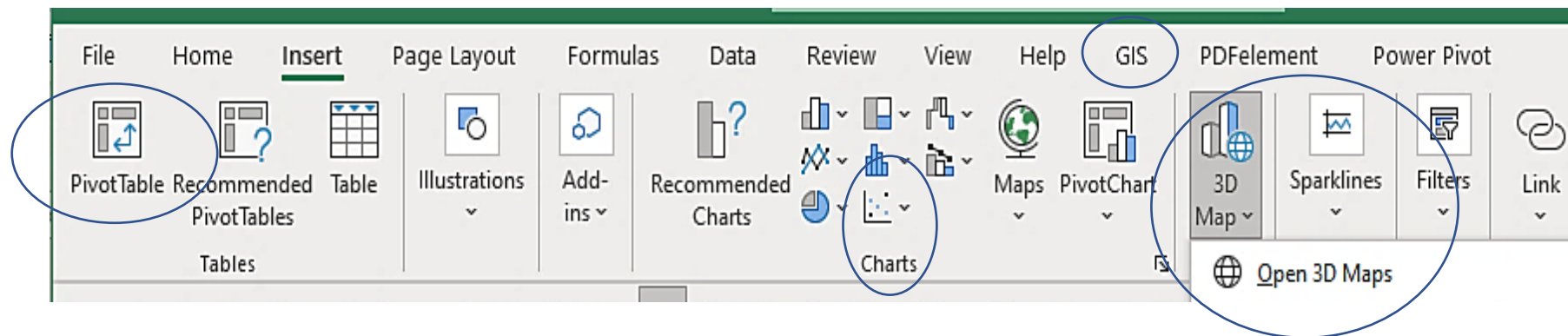
SITECODE	SITENAME	SITETYPE	AREAHA	LATITUDE	LONGITUDE
DK002X211	Bøllemose	B	20	55.8275	12.562222
DK002X214	Brobæk Mose og Gentofte Sø	B	46	55.74944	12.535556
DK002X338	Jægersborg Dyrehave	B	842	55.79222	12.568611
DK002Y109	Furesø med Vaserne og Farum Sø	A	1292	55.80806	12.368333
DK003X203	Gilbjerg Hoved	B	40	56.125	12.2725
DK003X204	Teglstrup Hegn og Hammermølle S	B	891	56.04917	12.551944
DK003X206	Rusland	B	248	56.0825	12.410278

Practice with Excel 3D Maps
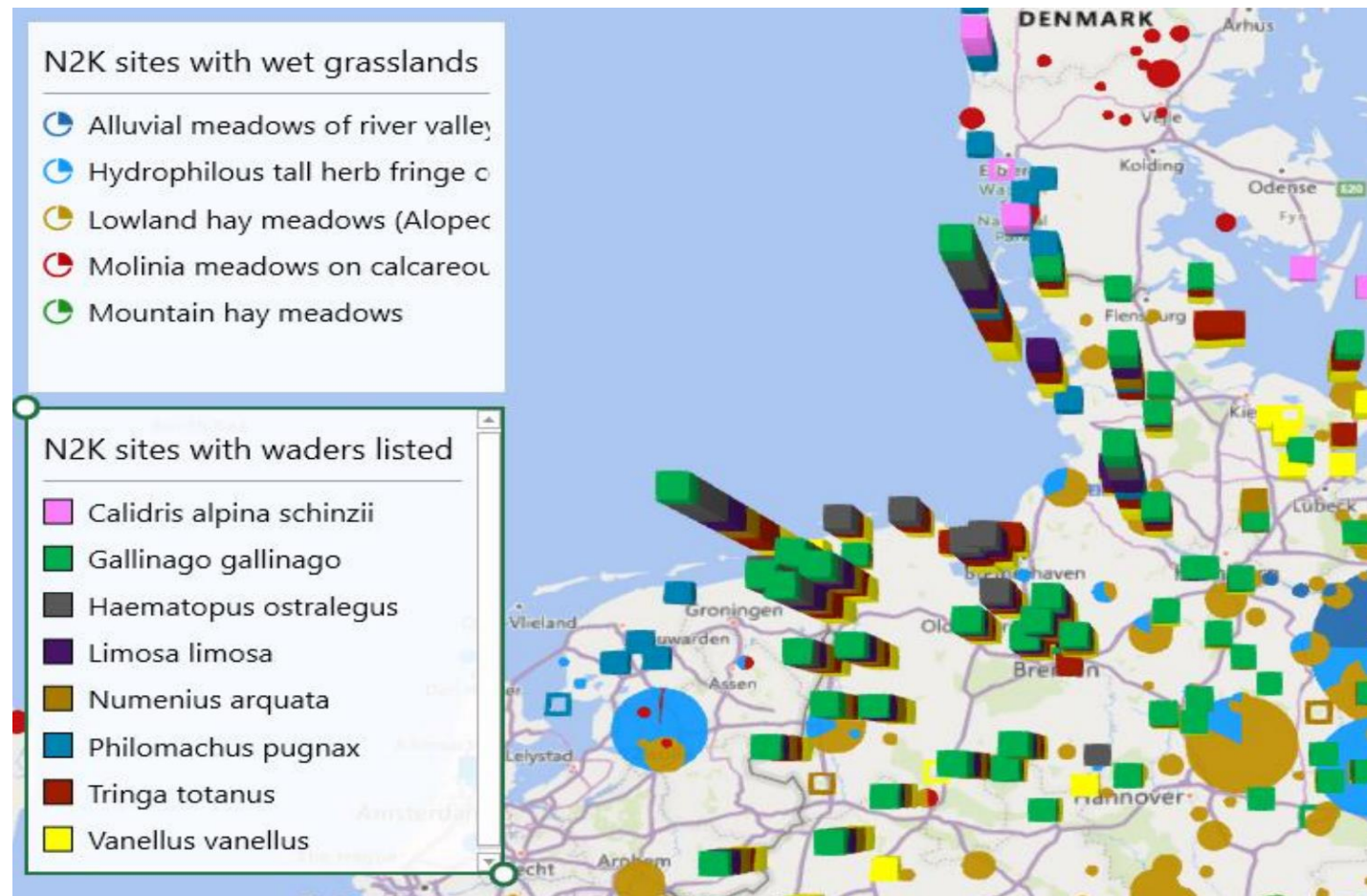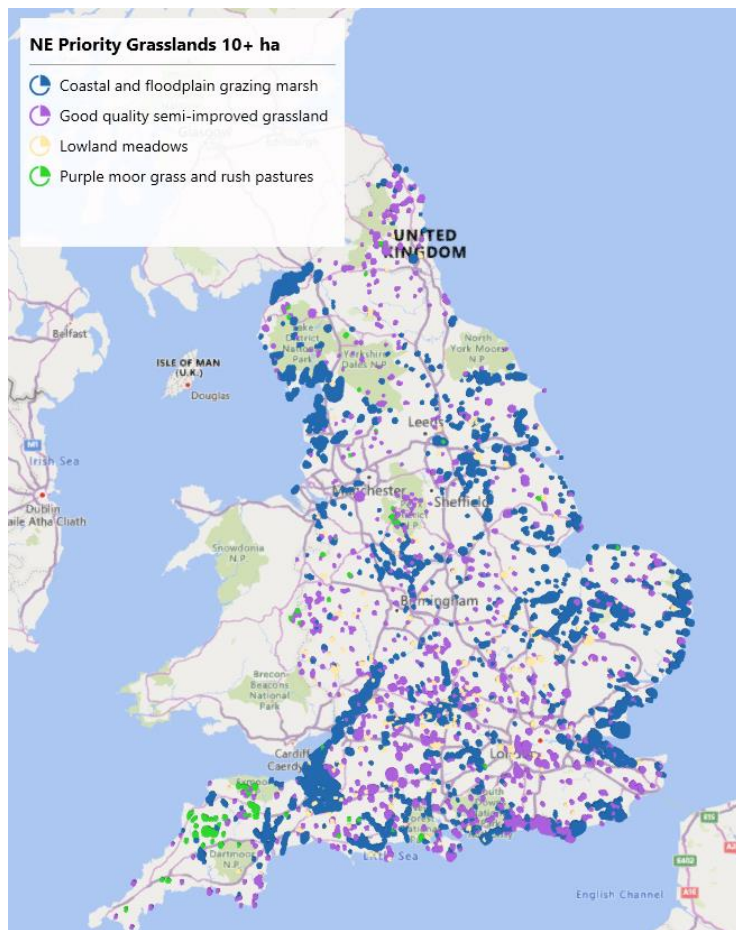
TOURISM IMPACT MODEL
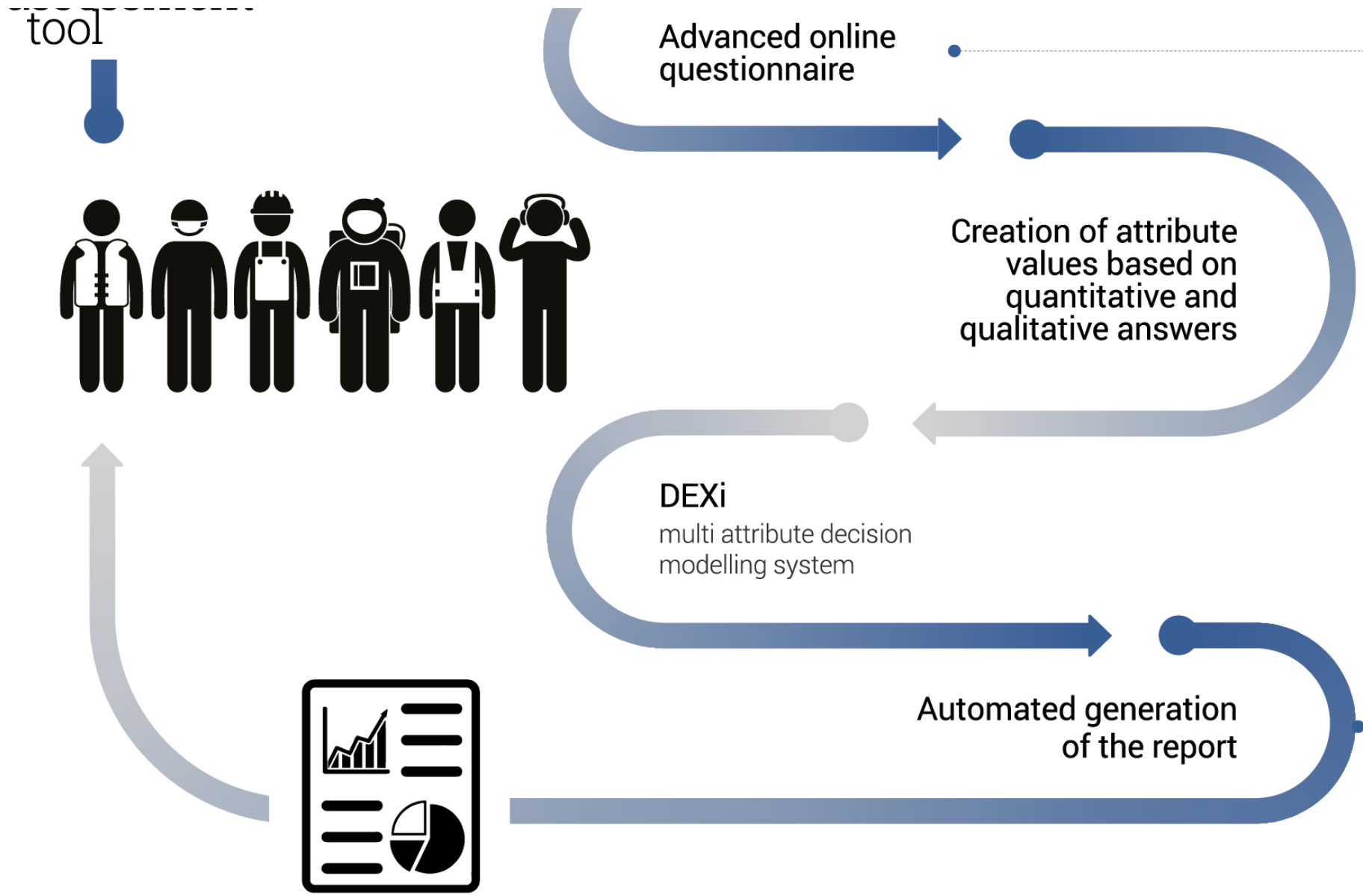
Strategic data-driven process

- Based on indicators for sustainable tourism (EU Directives, UN Sustainable Development Goals)
- Use of AI and high-performance data analytics to combine datasets from different sources

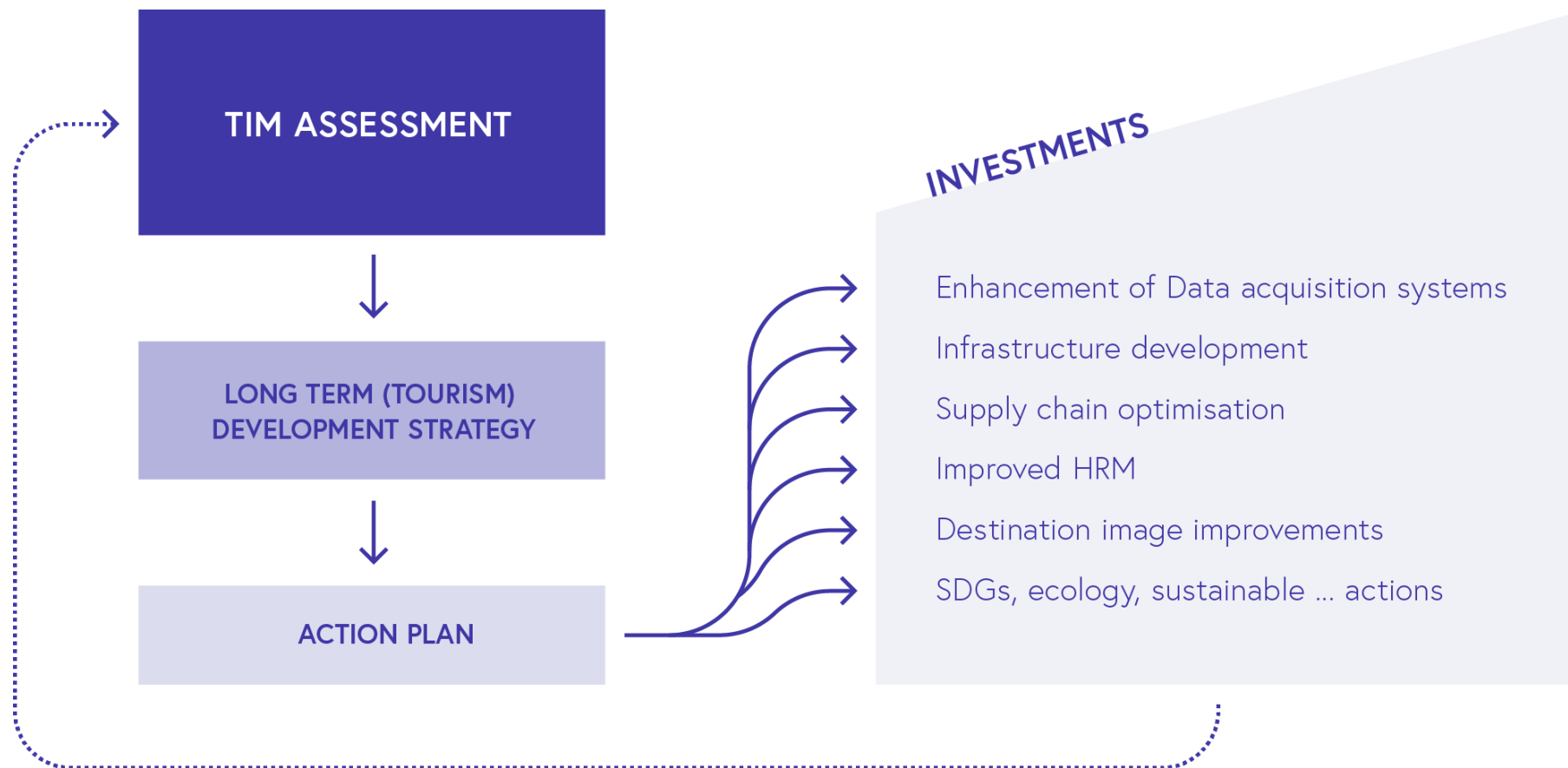**State-of-art planning for a specific location**

- Scenario testing of impact of tourism by manipulating various indicators
- A vital tool for setting tourism management priorities

Active monitoring and forecasting

- Digitalization of processes and iterative modelling
- Real time alerts and responses

tool

Advanced online questionnaire

Creation of attribute values based on quantitative and qualitative answers

DEXi
multi attribute decision modelling system

Automated generation of the report

TIM – Generator of sustainable progress

TIM ASSESSMENT

LONG TERM (TOURISM) DEVELOPMENT STRATEGY

ACTION PLAN

INVESTMENTS

Enhancement of Data acquisition systems

Infrastructure development

Supply chain optimisation
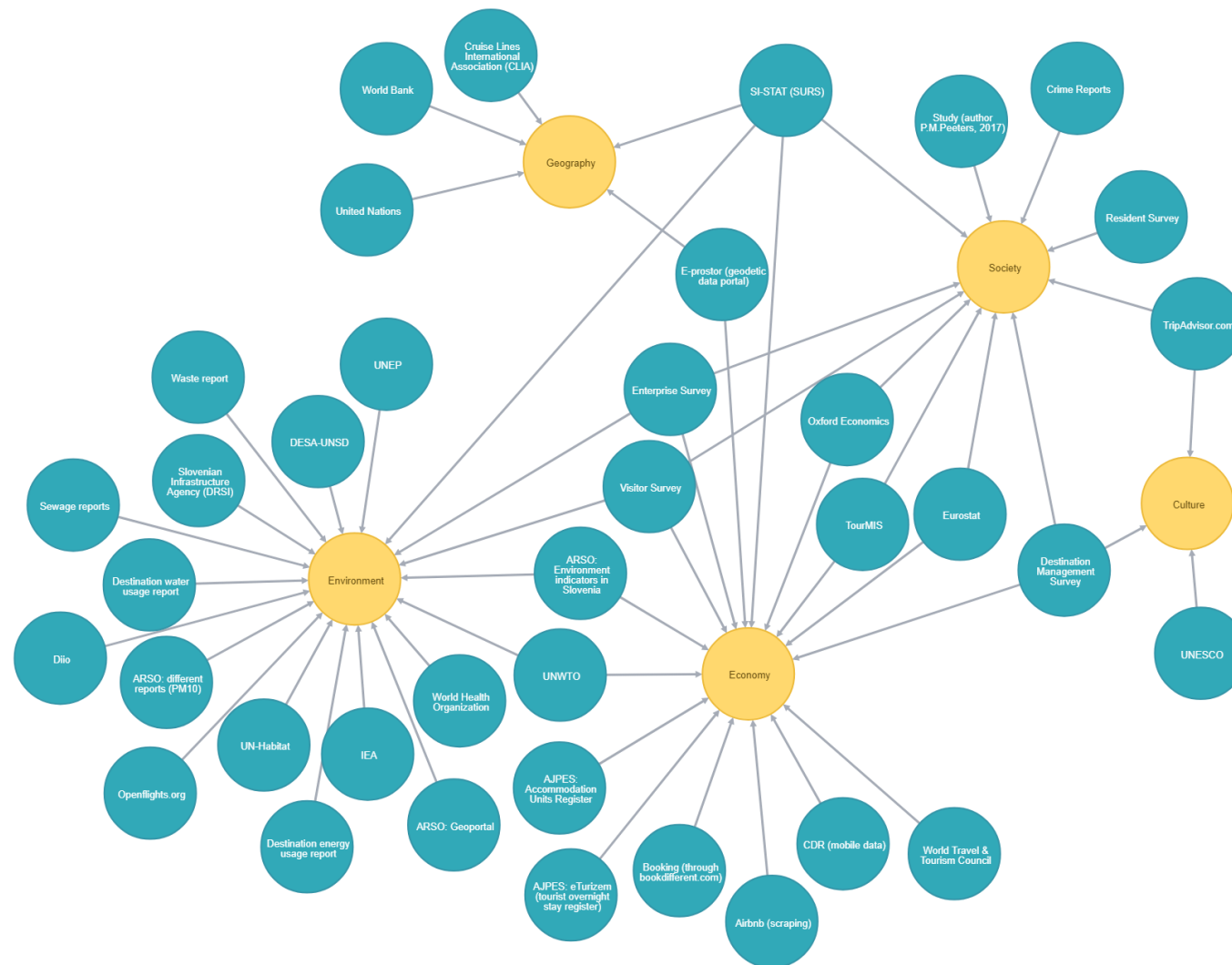
Improved HRM

Destination image improvements

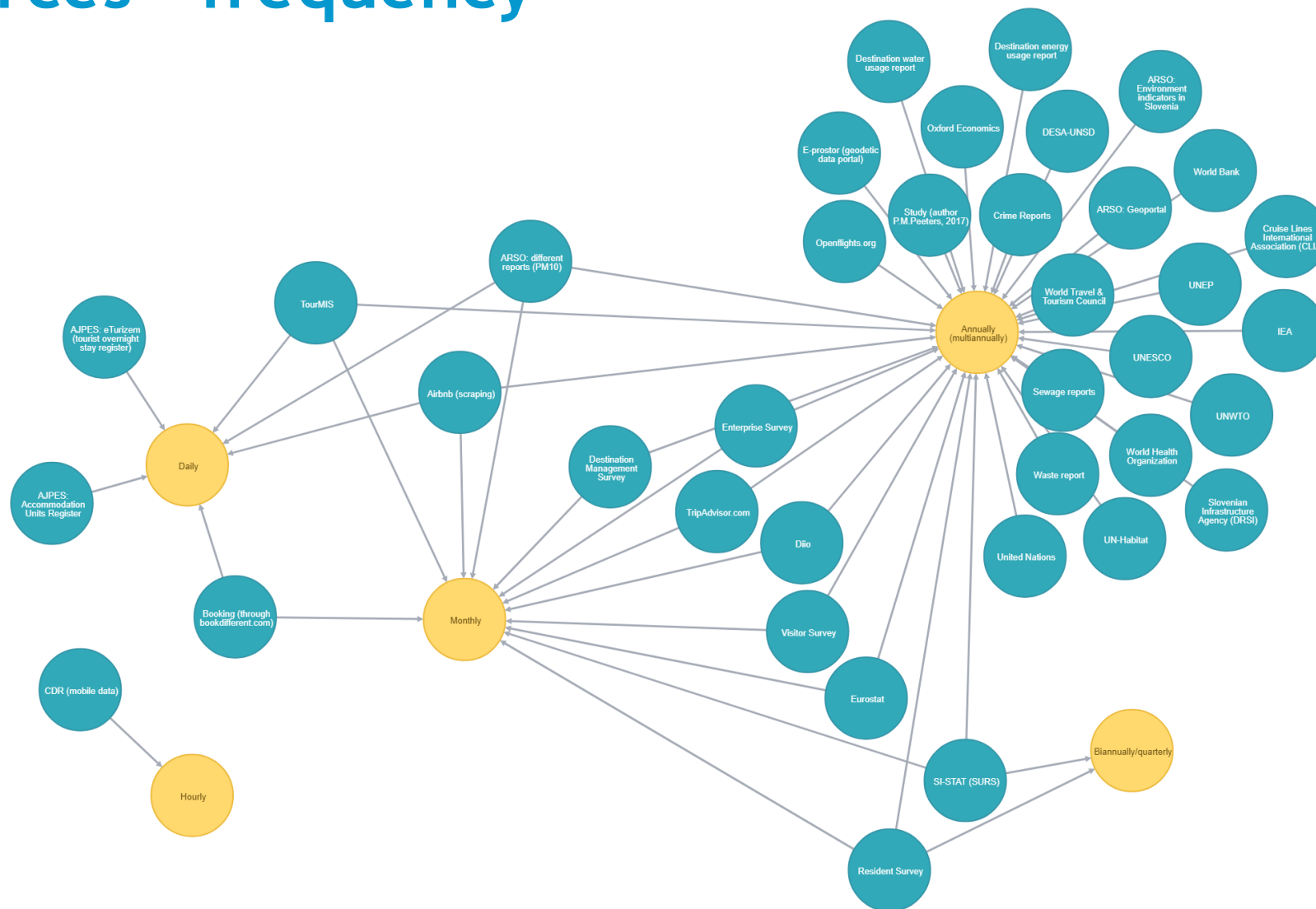SDGs, ecology, sustainable ... actions

Data sources - categories

- Geography
- Environment
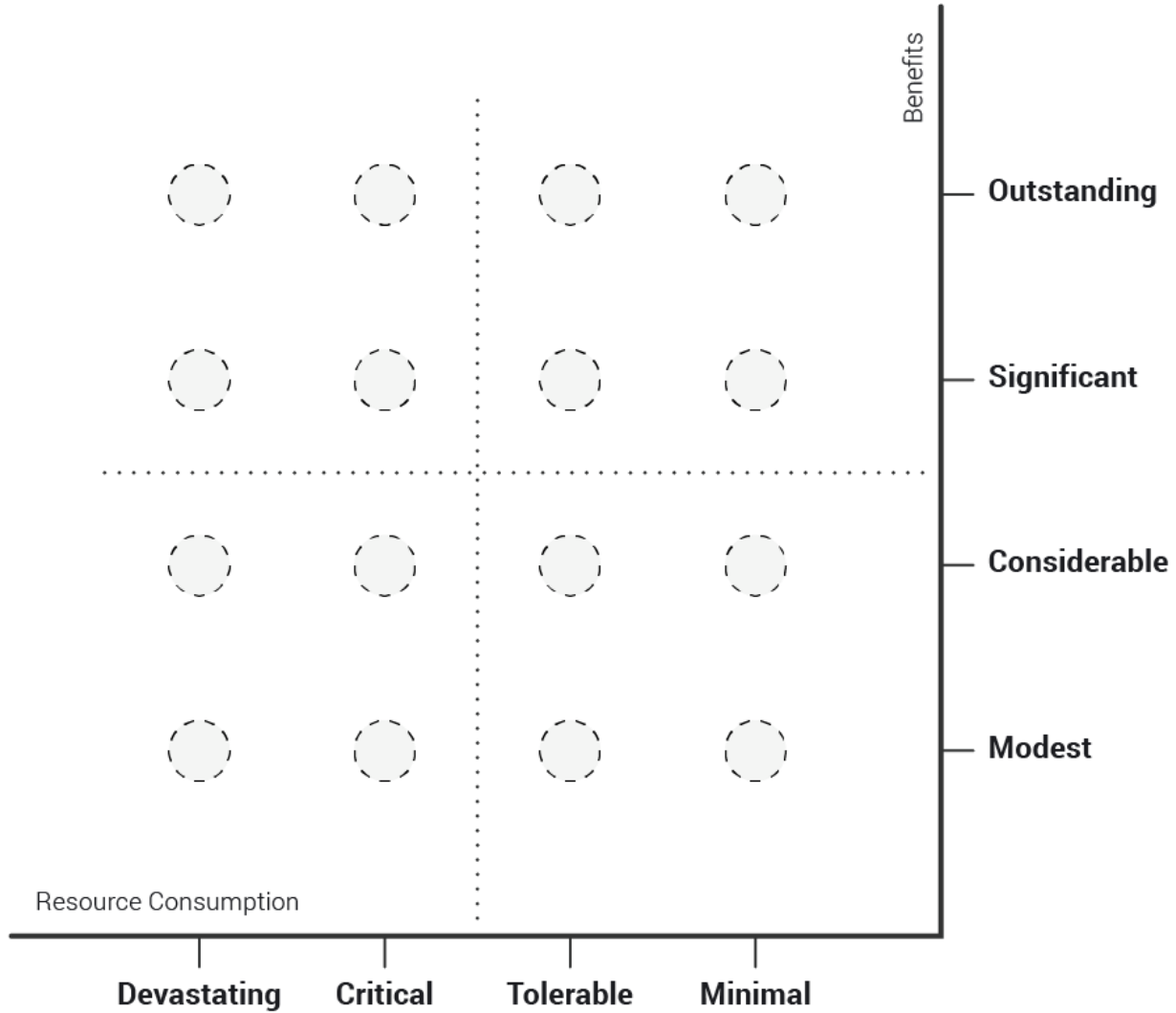- Society
- Culture
- Economy
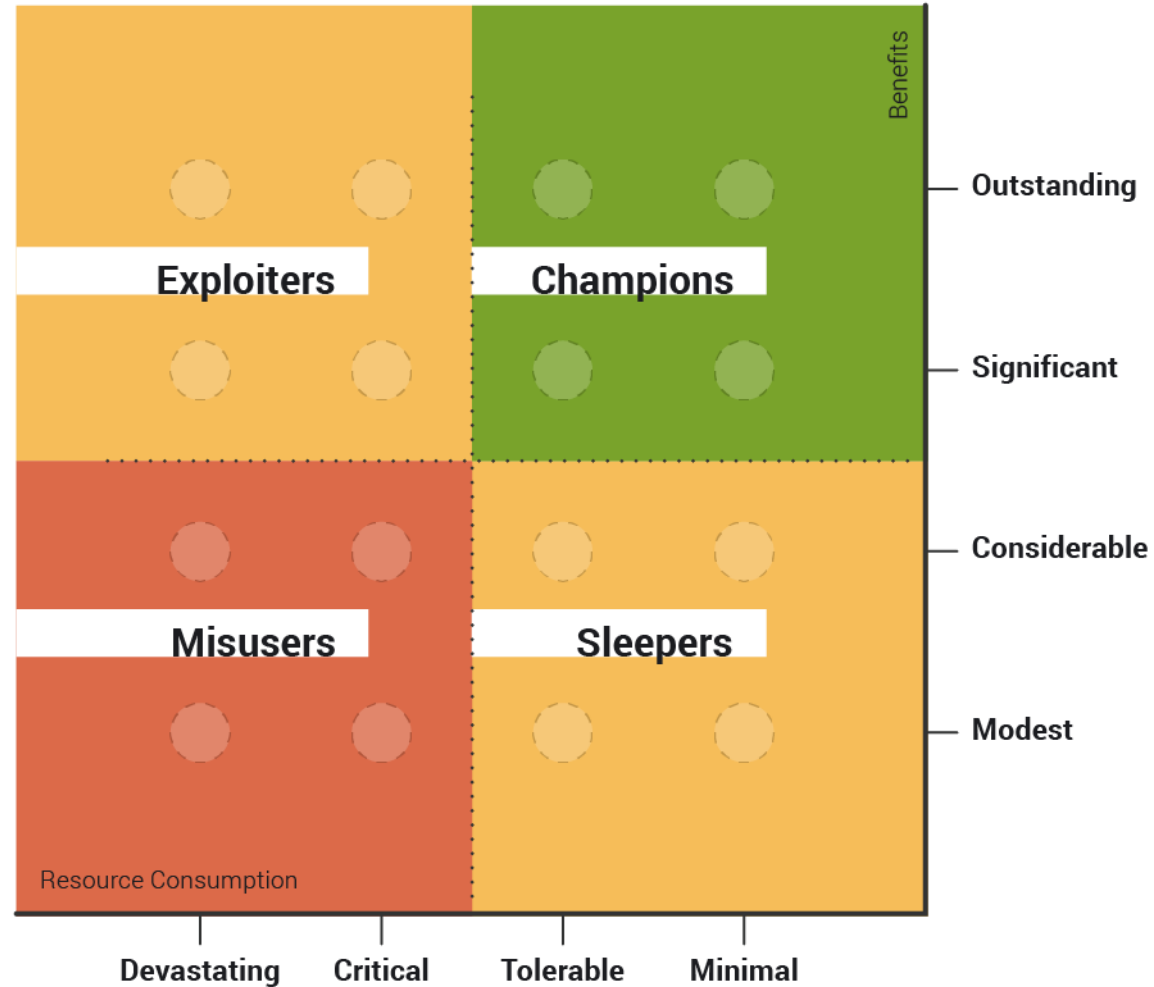
Data sources - frequency

- Hourly
- Daily
- Monthly
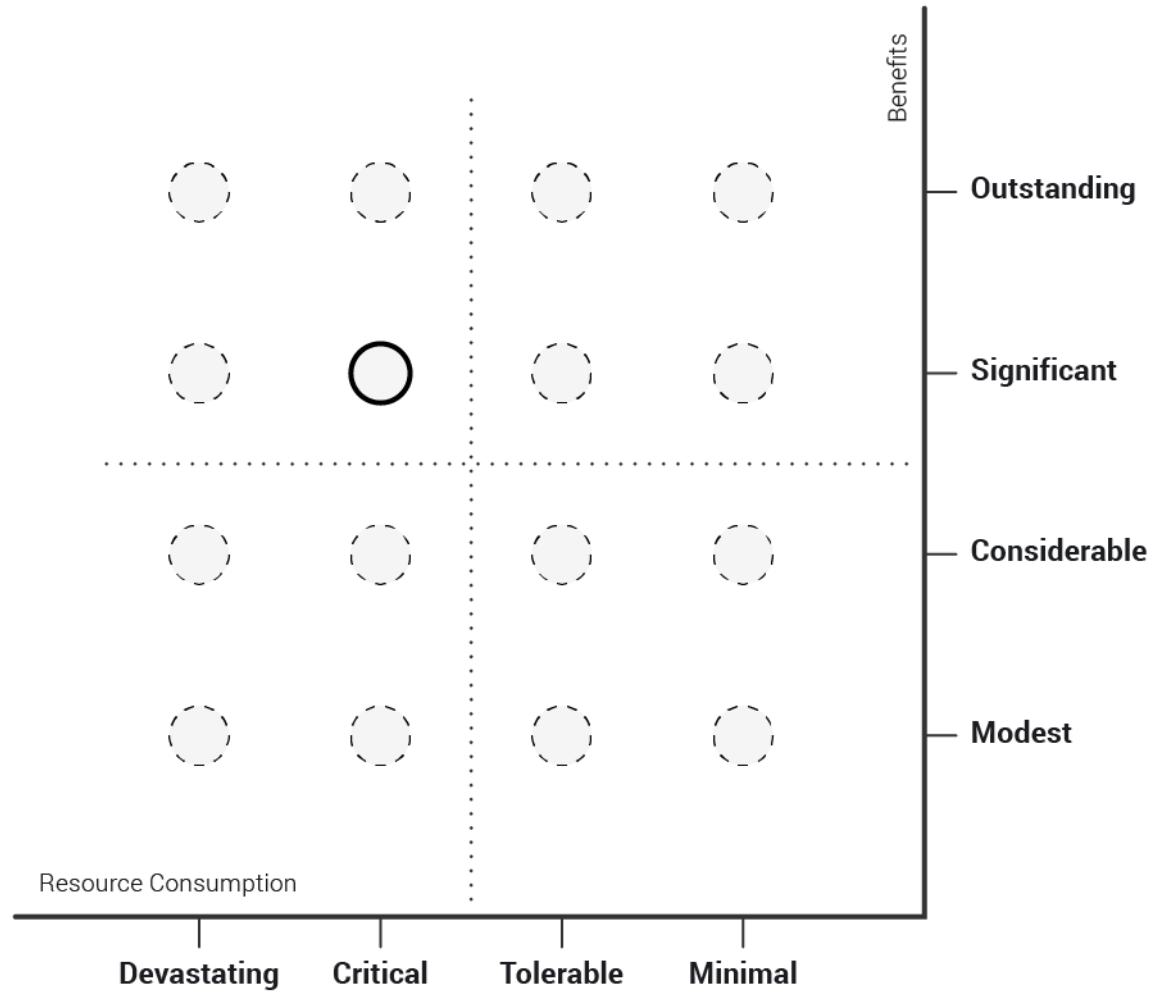- Biannually/ quarterly
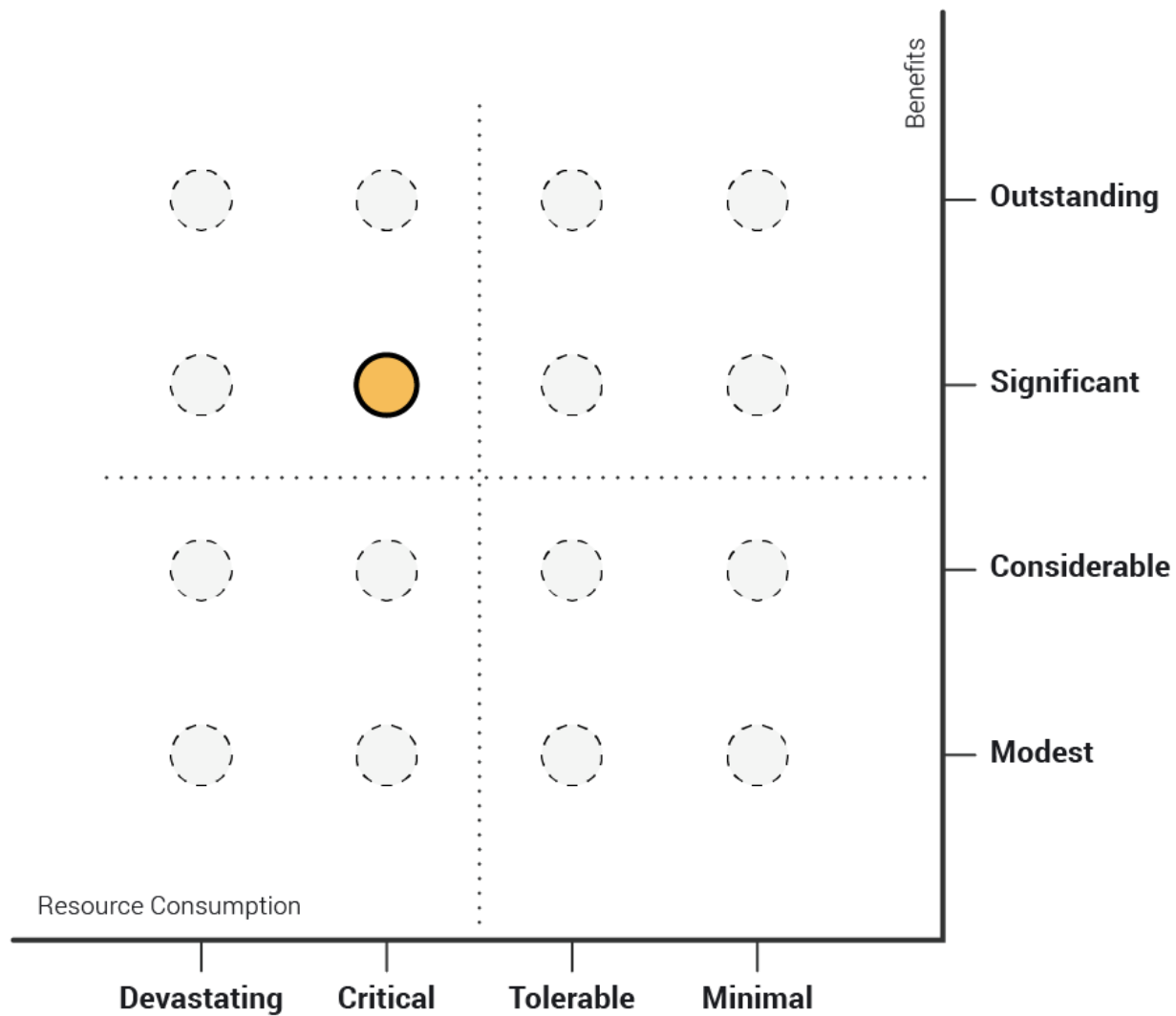- Annually (multiannually)

TIM positioning chart

TIM positioning chart
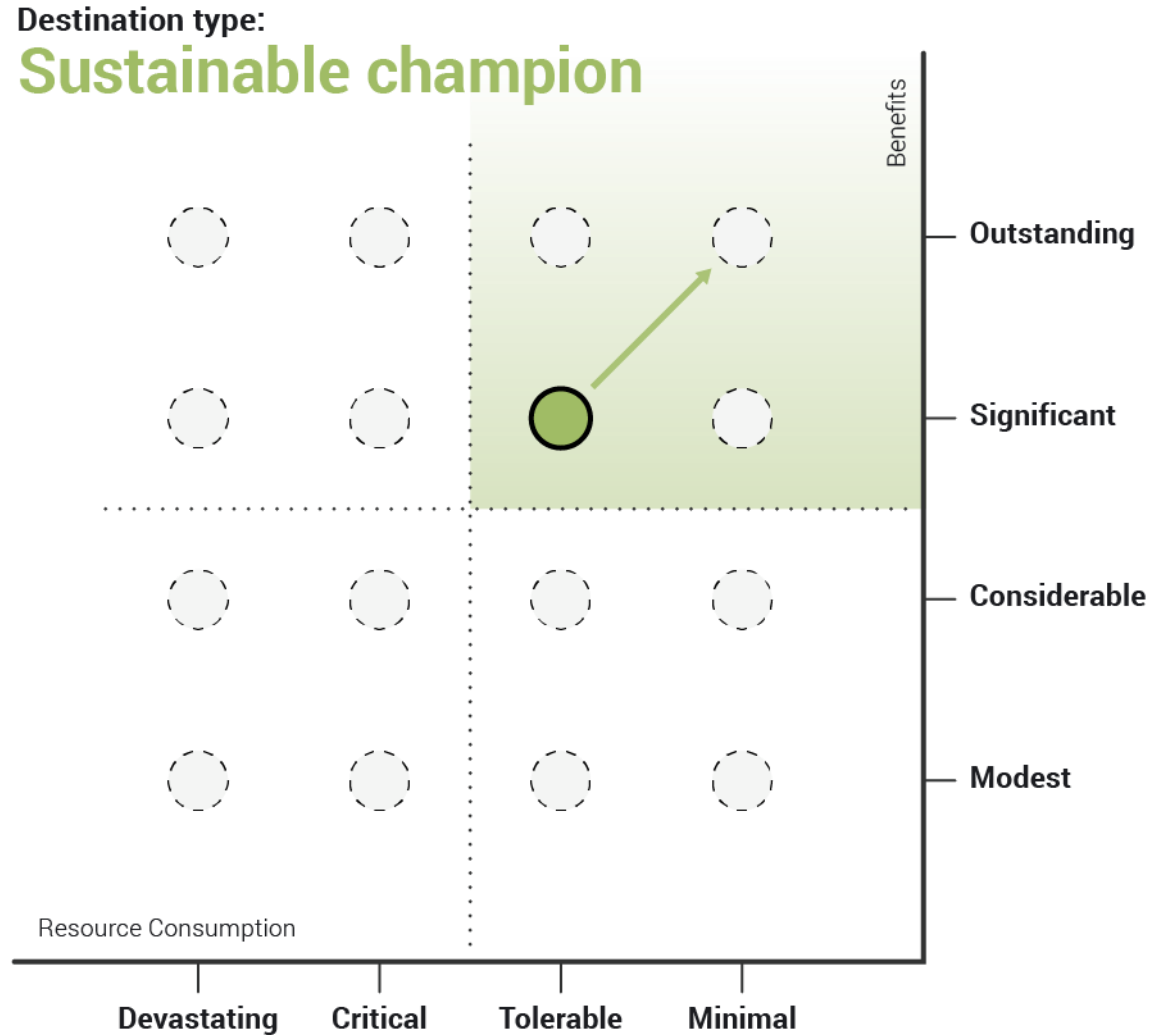
TIM positioning chart

TIM positioning chart

Colour of the circle presents the general condition of the location:

red - poor,
orange - mediocre,
green - great.

TIM positioning chart

Final result

Sectors	Clusters	Questions
Basic Questions	Location	13
	Cultural Heritage	4
	Natural Heritage	4
Environment and Space	Air Quality	14
	Waste water treatment	9
	Quality of bathing waters	7
	Drinking water consumption and supply	6
	Energy management	9
	Waste management	5
	Sustainable transportation	79
	Tourism infrastructure	5
	Spatial and land management	4
	Green infrastructure and policies	3
Economy	Tourism economy	18
	Tourism accommodation capacity	2
	Jobs in tourism	21
	Local economy	8
	Real estate	9
Society and Culture	Quality of life	17
	Health and safety	10
	Inclusion of vulnerable groups	2
	Preservation of heritage	10
	Events and happenings	6
Collaboration	Local residents	5
	National government	5
	Third sector, voluntary and civic sector	9
	Tourism service providers	9
	Other stakeholders	2
		295

Odesa Data Providers

- Department of Culture and Tourism
- Department of Architecture and Urban Planning
- Department of Ecology and Development of Recreational Areas
- Department of Economic Development
- Department of Municipal Economy
- Department of Transport, Communications and Traffic Management
- Division of Land Resources of the Department of Communal Property
- Municipal Enterprise "Odessa International Airport"
- Odessa Seaport

			Відповідь	Посилання на вебсторінку з інформацією	Періодичність оновлення інформації
B5.7 Port at your Location		**B5.7 Порт у вашому місті**			
A. Does your location have a port?	• Number • not present	A. Чи є у вашому місті порт?	• **Так**	http://www.port.odessa.ua/ru/	**протягом року**
If yes		Якщо так			
B. What is the port capacity for smaller vessels (< 60m)?	number	B. Яка місткість порту для менших суден (<60 м)?	• Число	До 50 од. одночасно На плавпирсах (в районе яхтклуба) Up to 50 units at a time On the floats (in the area yachtcluba)	
C. What is the port capacity for ferries?	number	C. Яка місткість порту для поромів?	• Число	2 причала (№№ 14-16 и 19-20) в залежності від того, в яку сторону викидається апарель 2 berth (№№ 14-16 19-20) depending on which direction the aparel is thrown into	
D. What is the port capacity for cruise ships?	number	D. Яка місткість порту для круїзних суден?	• Число	5 причалів (пасажирський комплекс- загальна довжина причальної лінії - 1105м) 5 berths (passenger complex-total length of berthing line - 1105m)	
E. What is the port capacity for other large vessels?	number	E. Яка місткість порту для інших великих суден?	• Число	55 причалів (протяжність причальної лінії - 10 км 200 м) 55 berths and (length of berthing line –10 km 200 m)	
F. What are the number of smaller vessels at your port?	number per month	F. Яка кількість менших суден у вашому порту?	• число на місяць	Прогулянкові катери: 2018 - 9 2019 - 9	

Показники	I квартал 2017	II квартал 2017 року	III квартал 2017 року	IV квартал	I квартал 2018	II квартал 2018 року	III квартал 2018 року	IV квартал	I квартал 2019	II квартал 2019 року	III квартал 2019 року	IV квартал року
Середньооблікова кількість штатних працівників, тис. осіб The average number of full-time employees, thousand. Persons	244,0	245,6	248,1	248,6	250,3	248,5	248,0	247,6	249,3	250,7	247,4	243,5
Середньомісячна номінальна заробітна плата одного штатного працівника, грн Average monthly nominal salary of one full-time employee, UAH	6036	6659	6802	7536	7424	8290	8400	8838	8742	9492	9594	10323
	28.8	29.58	31.22	33.54	32.37	30.51	32.63	31.54	30.44	29.47	26.07	26.16
Gross monthly	210	225	218	225	229	272	257	280	287	322	368	395
Net monthly	126	135	131	135	138	163	154	168	172	193	221	237

Інформація АТ «ДТЕК Одеські Електромережі»

			Надати відповідь				Посилання на вебсторінку з інформацією (описом)	Періодичність оновлення інформації
B3.1 Electricity Consumption and Electrical Grid		**B3.1 Витрата електроенергії та електрична мережа**						
A. What is the total electricity consumption at your location (in kWh)?	number per month	A. Яке загальне споживання електроенергії у вашому місті (Одесі) (у тис.кВт-годин)?		2017р.	2018р.	2019р.	н/і	н/і
			Січень	330886,0	312449,0	331040,0		
			Лютий	297960,0	296913,0	286427,0		
			Березень	273954,0	324386,0	280765,0		
			Квітень	251618,0	225767,0	248172,0		
			Травень	209801,0	208993,0	216604,0		
			Червень	202326,0	211149,0	229795,0		
			Липень	217707,0	231254,0	223668,0		
			Серпень	234410,0	243336,0	228388,0		
			Вересень	202978,0	208719,0	202461,0		
			Жовтень	249403,0	237700,0	239846,0		
			Листопад	281975,0	300429,0	272537,0		
			Грудень	302398,0	342390,0	306456,0		
			Всього	30554416,0	3143485,0	6209644,0		

C3.3 Job issues

A surplus of job openings are openings which were not filled within the span of a month. A surplus of job openings, unregistered employment, and unemployed people in tourism could indicated a problem in tourism employment. For example, a large surplus of job openings in tourism along with a high number of unemployed people might mean a strong demand for trained employees that could not be satisfied with the local workforce.

E. What is the monthly number of the labour force in your country? 🛈 COMMENT

2019 (Last Year)

‹ 2019					
JAN	FEB	MAR	APR	MAY	JUN
1790Ɪ	1790Ɪ	1790Ɪ	18014	18014	18014
JUL	AUG	SEP	OCT	NOV	DEC
1808Ꞌ	1808Ꞌ	1808Ꞌ	1806ꞌ	1806ꞌ	1806ꞌ

2020 (Estimation)

2020					
JAN	FEB	MAR	APR	MAY	JUN
1803ꞇ	1803ꞇ	1803ꞇ	1768ꞇ	1768ꞇ	1768ꞇ
JUL	AUG	SEP	OCT	NOV	DEC
1768ꞇ	1768ꞇ	1768ꞇ	1768ꞇ	1768ꞇ	1768ꞇ

Annual visitor days

TOURISM IMPACT MODEL

Figure 5: One day visitors in last year (2019) and current year (2020)

One day visitors in last year

One day visitors in current year
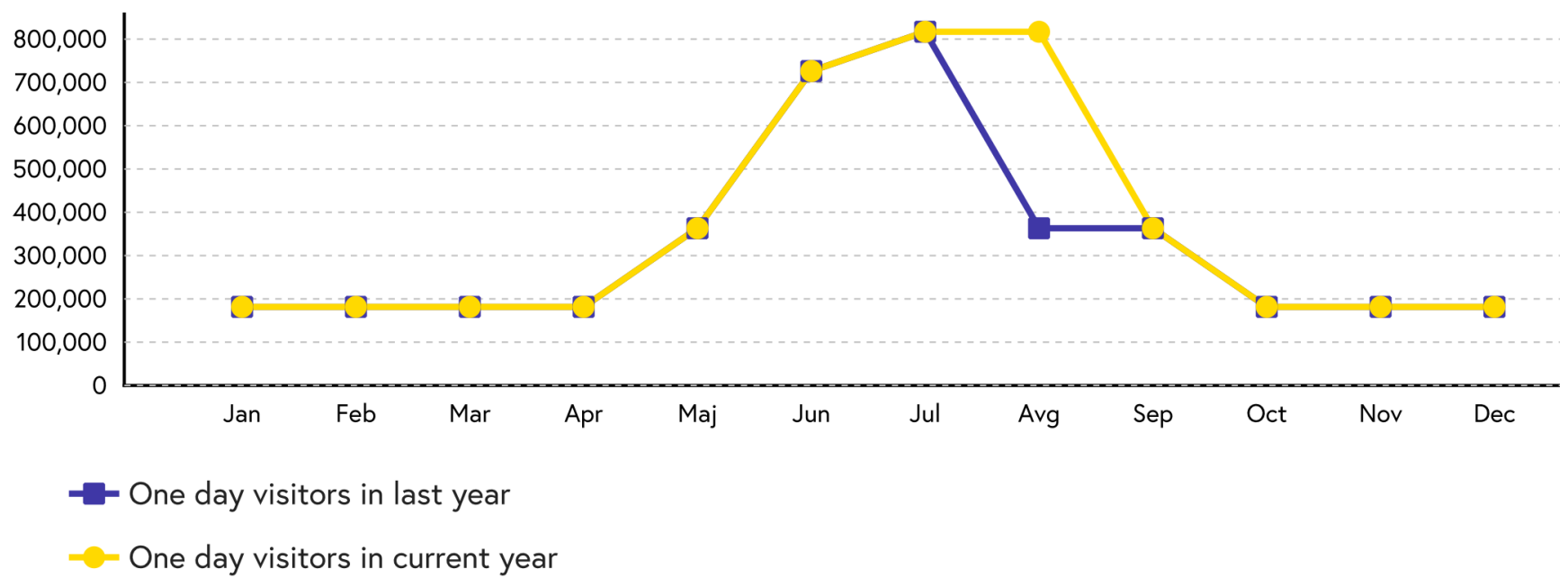
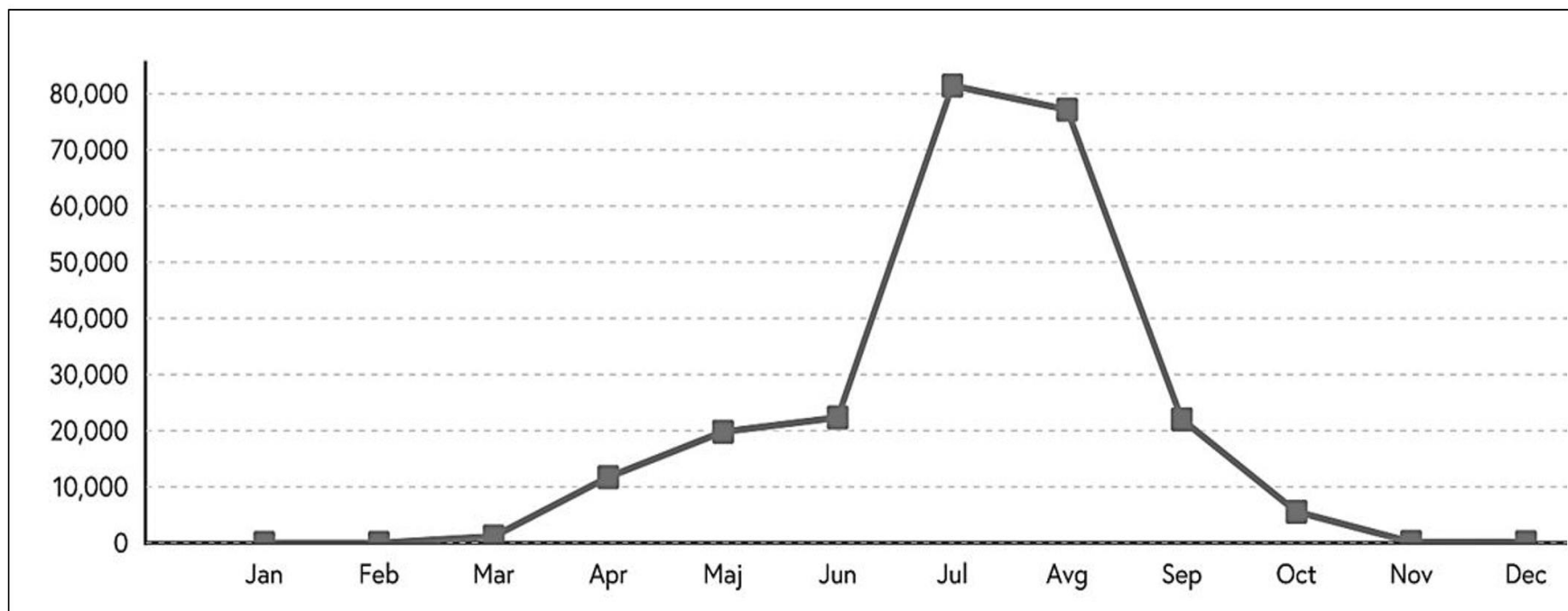# Passenger arrivals at Odesa sea port

Figure 3: Monthly passenger arrivals at <u>Odessa sea</u> port in 2019

Source: Odessa Sea Port
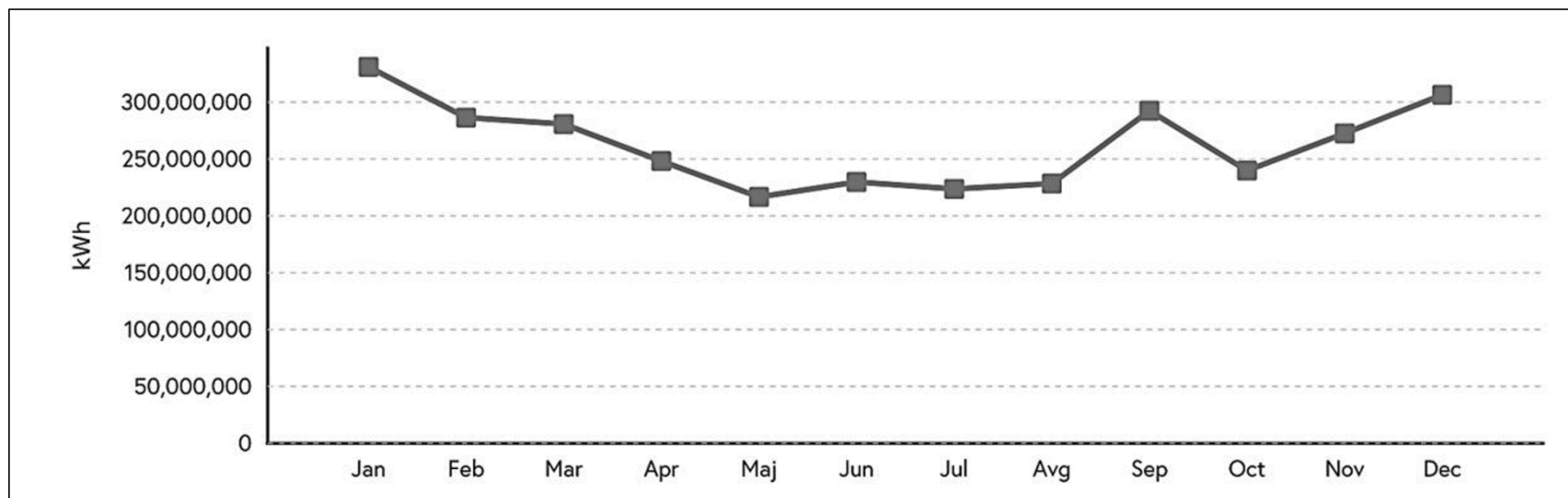
Monthly electricity consumption

Figure 4: Monthly total electricity consumption in Odessa city in 2019

Source Odessa City Council

Overall result

No data available.

Figure 2: Overall data accuracy level

low	medium	high

Conclusions

- The current implementation of TIM was not very successful in Odesa as it requires data that is locally not collected, too incomplete or inaccessible so that only partial results could be obtained. There needs to be a big improvement in tourism digitalisation locally, but also more flexibility incorporated in TIM to cope with missing data and ability to detect the "real signal" of tourism impact in destinations with large populations and diverse economic sectors.

- The big data analytics case study proved more valuable for the Odesa Department of Culture and Tourism in the short term. The development of customer-led tourism big data dashboards would be a useful means for improving tourism planning in many destinations.

- Local stakeholders were broadly engaged with the project and appreciated the significance of Tourism 4.0 approaches in achieving more sustainable tourism outcomes.

REGINNA 4.0

Paul Goriup
NGO Agricola, Odesa, Ukraine

www.reginna4-0.eu