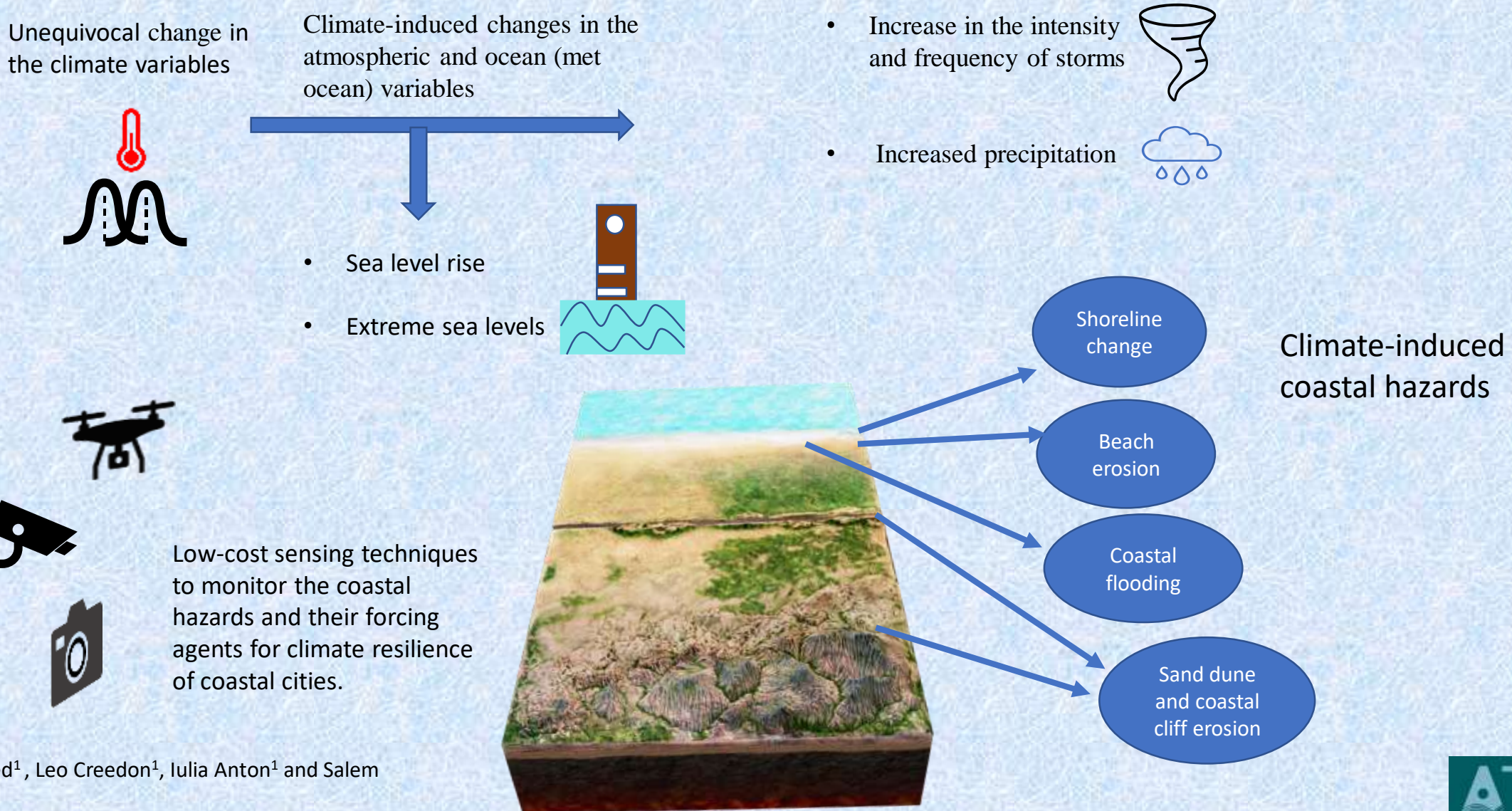


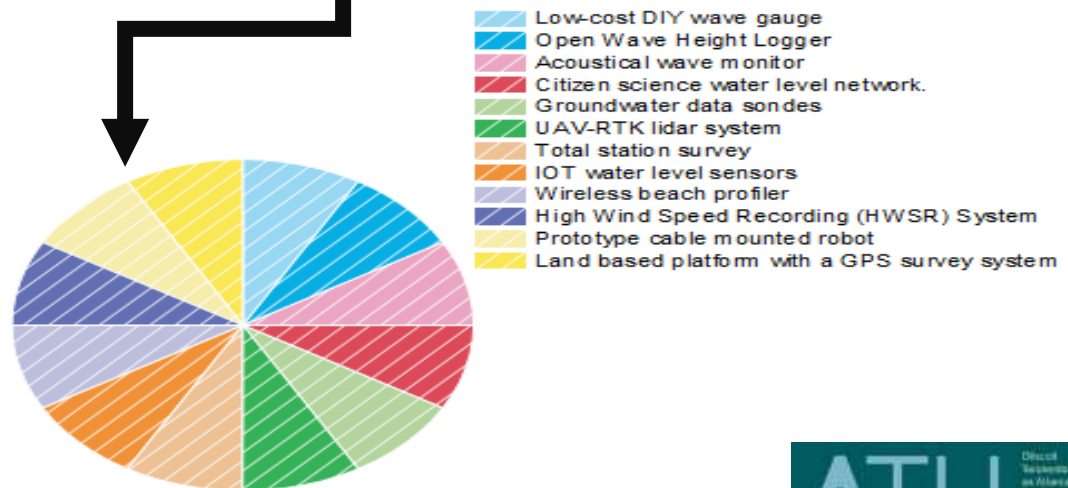
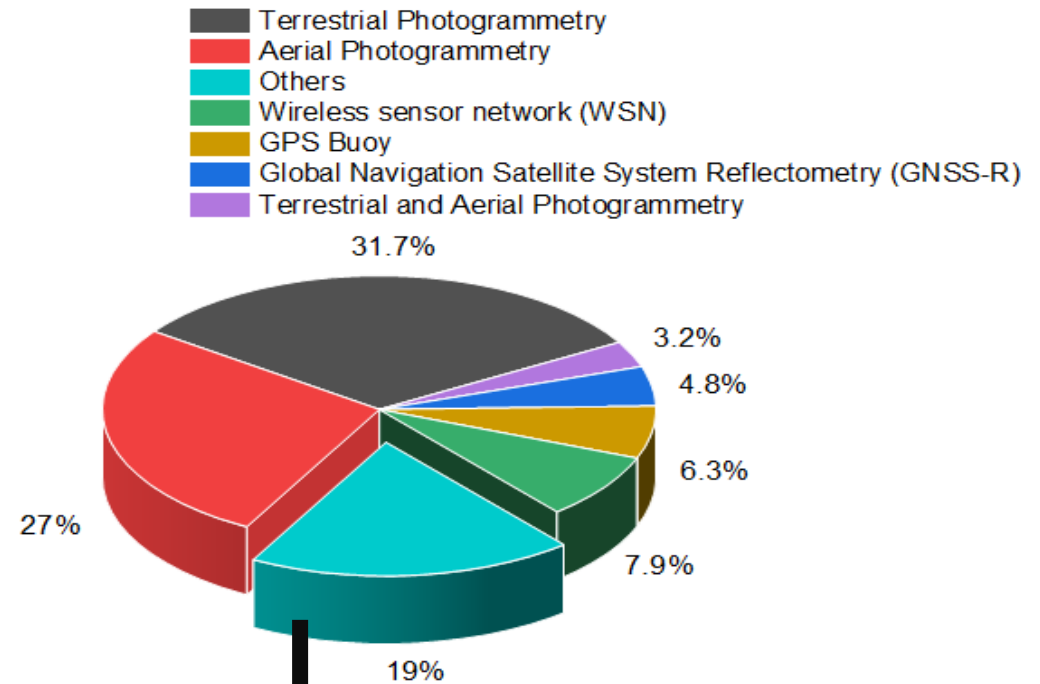
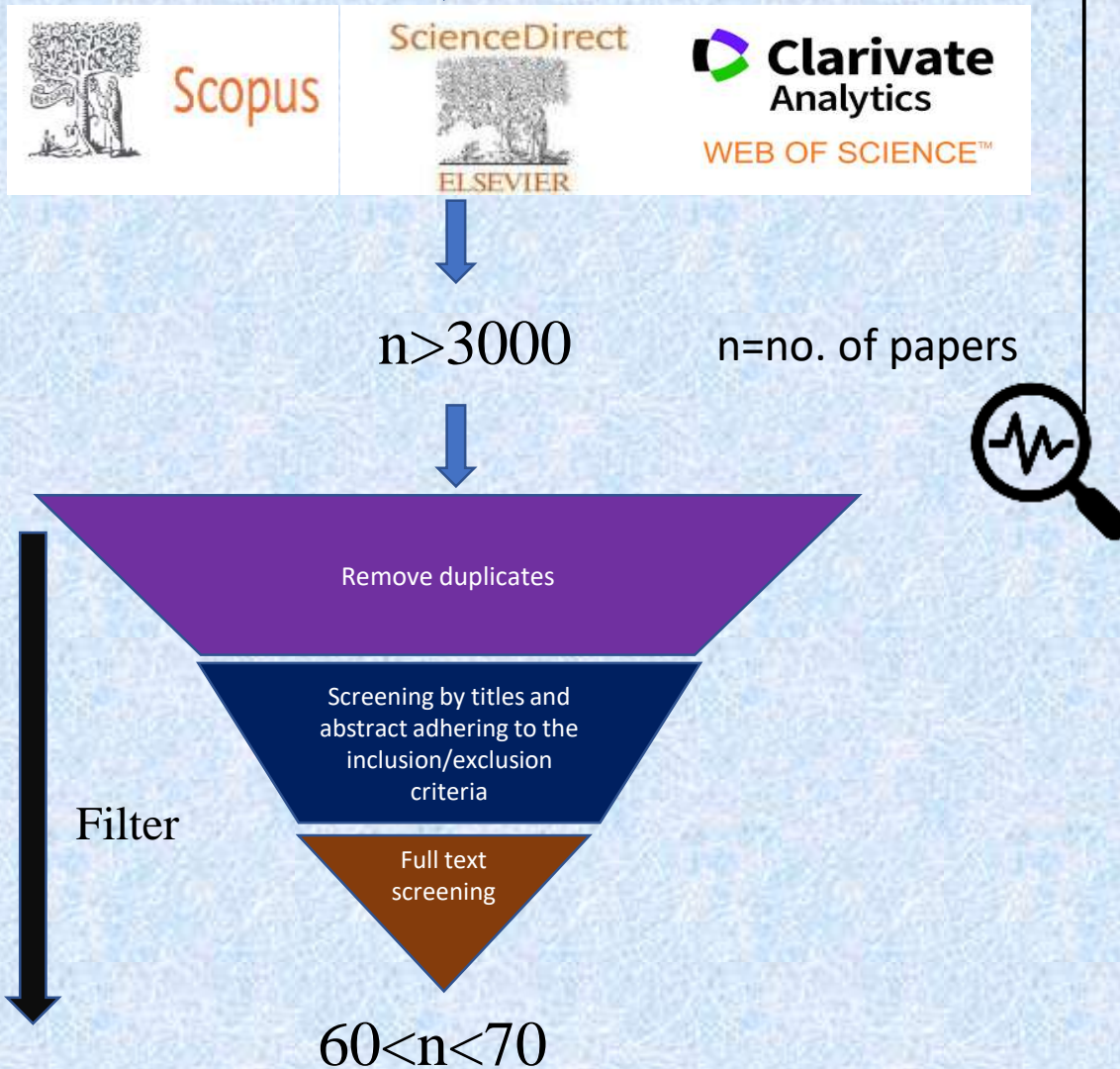


# The use of low-cost sensors for monitoring coastal climate hazards and developing early warning support against extreme events



# Latest low-cost sensors identified from peer-reviewed literature in scientific databases through a systematic literature review approach for the period 2010-2021

Entered string of keywords





# Coastal hazards/forcing agents monitored by the low-cost sensing technologies

## Low-cost sensors/sensing methods.

Terrestrial Photogrammetry

Video-monitoring system (VMS)

Time-Lapse photography

Smartphone based technology

Aerial Photogrammetry

Unmanned aerial vehicle (UAV)

Global Navigation Satellite System Reflectometry (GNSS-R)

Low-cost GPS/GNSS receivers

Wireless Sensor network (WSN)

Video sensor network

Prototype wireless sensor network

GPS/GNSS Buoys

Low-cost GPS/GNSS receivers attached to buoys/prototype drifters

Low -cost GNSS buoy equipped with a self assembled IMU

Terrestrial+Aerial Photogrammetry

Video monitoring system +UAV photogrammetry

Others

UAV-RTK lidar system  
Land based platform with GPS survey system.

Open wave height logger  
IOT water level sensors

Groundwater data sondes  
Total station survey

DIY wave gauge  
Citizen science water level network

Wireless beach profiler

High wind speed recording system

Prototype cable mounted robot

Acoustical wave monitor

## Coastal Hazards/Forcing agents

Shoreline change

Coastal erosion

Wave parameters

Dune erosion/ morphological change /migration

Cliff retreat/morphological changes

Beach morphology

Coastal flooding

Wave run-up

Shoreline change

Coastal flooding

Coastal erosion

Storm surge

Tides

Wave parameters

Volumetric changes in sediment

Dune erosion/morphological change

Sea level

Tides

Storm surge

Coastal erosion

Sea level

Level variation of sand layer in a sandy beach/volumetric changes

Barometric pressure

Sea level

Wave parameters

Storm surge

Extreme events

Storm surge

Coastal erosion

Shoreline change

Storm surge

Coastal erosion

Coastal flooding

Shoreline change

Wave parameters

Volumetric changes in sediment

Wind

Water level

Tides

Extreme events



<https://score-eu-project.eu/>

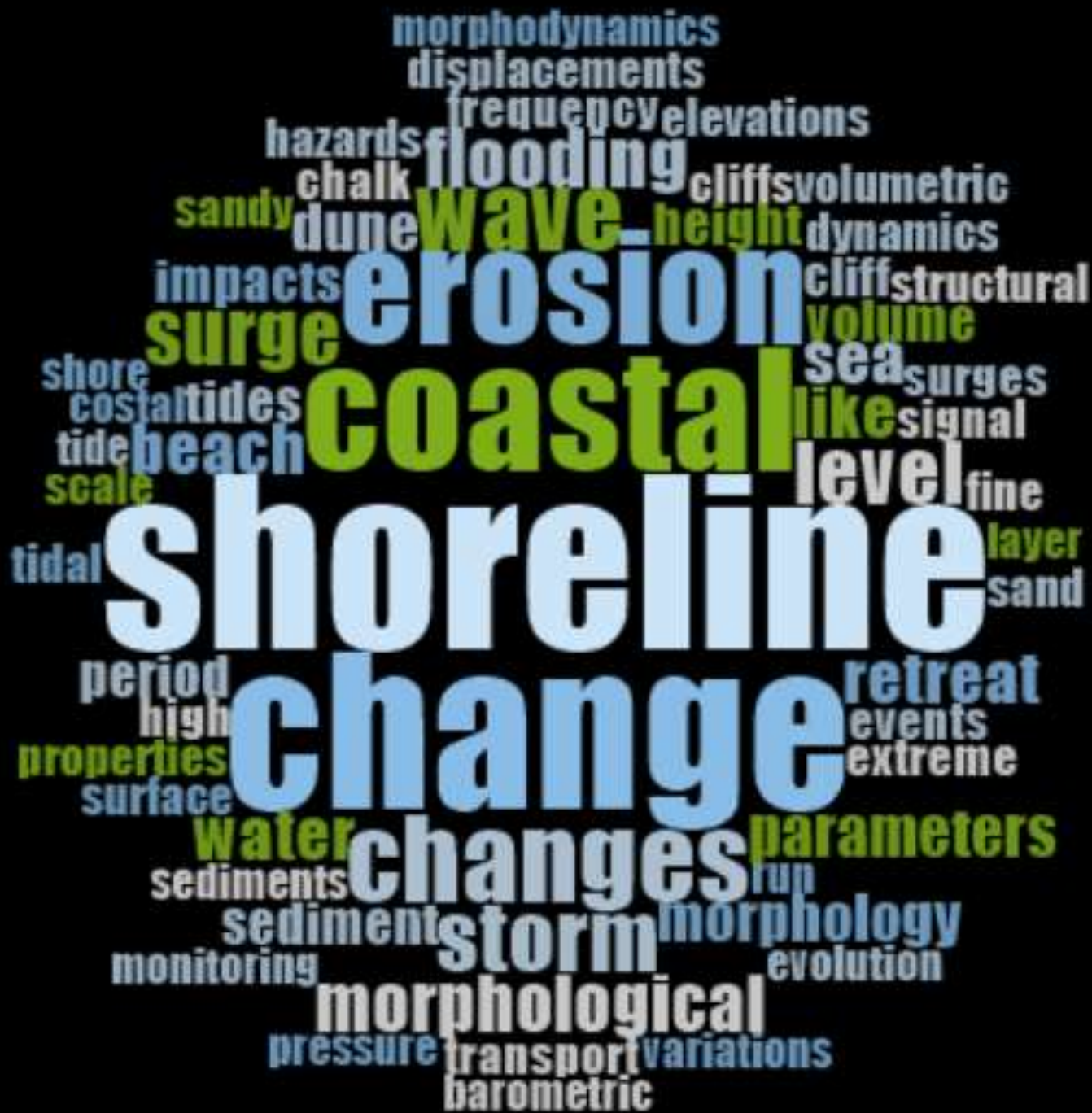
This work has been carried out as part of work package 4 (WP4) of the European Union Horizon 2020 (EU H2020) project called SCORE (Smart Control of the Climate Resilience in European Coastal Cities).



#### **Main objectives of the Task 4 within WP4 :**

- ☐ Complement and integrate by fillings gaps of sparse networks of institutional sensors with a denser network of low-cost citizen science sensors to monitoring a set of critical parameters of interest for each Coastal City Living Lab (CCLL) <https://score-eu-project.eu/coastal-city-living-labs/>
- ☐ These low-cost and up-to-date technologies are to be identified through a search of peer-reviewed and grey literature.
- ☐ These low-cost sensing technologies will be chosen by citizens, associations and other stakeholders in each CCLL with the help of the SCORE technological partners to better fit the needs of each local community





- The low-cost sensors from peer-reviewed literature for monitoring coastal hazards have been validated with standard instruments showing good performance
- Terrestrial and Aerial Photogrammetry are the most used methods for monitoring a wide range of Coastal hazards
- These could be potentially utilised for early warning support
- Some of these sensors could be utilised for citizen science activities.

*Example of a citizen science project to monitor coastline evolution through out the world.*



CoastSnap

- <https://www.coastsnap.com/>





# Thank you for listening!



Dr. Salem Gharbia  
ATU Sligo, Ireland  
Gharbia.Salem@itsligo.ie  
contact@score-eu-project.eu



Dr. Leo Creedon  
ATU Sligo, Ireland  
creedon.leo@itsligo



Tasneem Ahmed  
ATU Sligo, Ireland  
[tasneem.ahmed@mail.itsligo.ie](mailto:tasneem.ahmed@mail.itsligo.ie)



Dr. Iulia Anton  
ATU Sligo, Ireland  
anton.iulia@itsligo.ie