



CIRCULAR WEEKEND 2023



Universidad de
Oviedo





300

% N° Papers on MPs in sewage sludge worldwide

250

200

150

100

50

0

1996

2001

2003

2004

2005

2008

2009

2010

2011

2012

2013

2014

2015

2016

2017

2018

2019

2020

2021

2022

2023

N° papers in MPs in sewage sludge (october 2023)

282

176

106

82

64

42

28

14

5

4

6

2

3

2

4

4

4

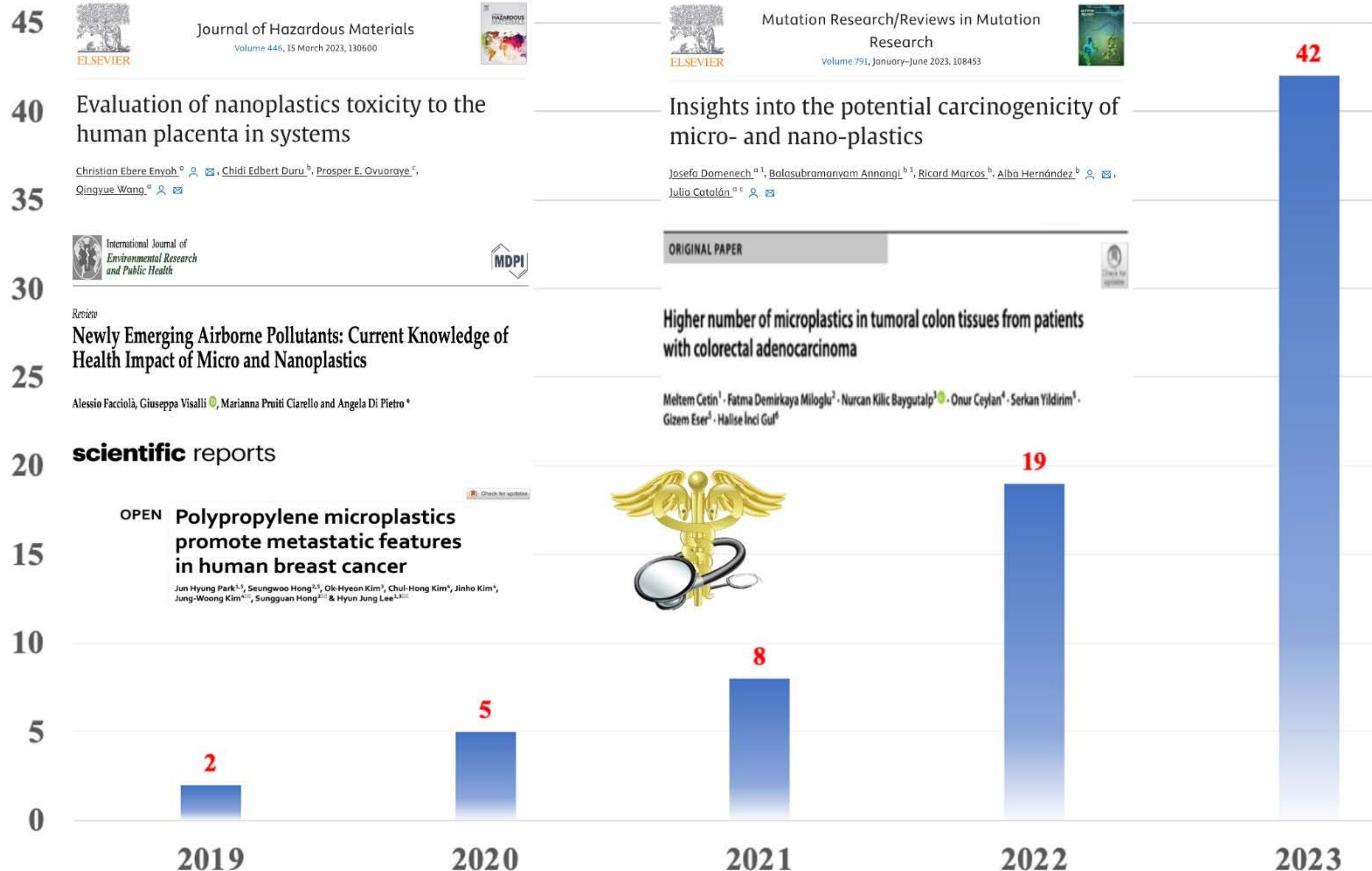
1

1

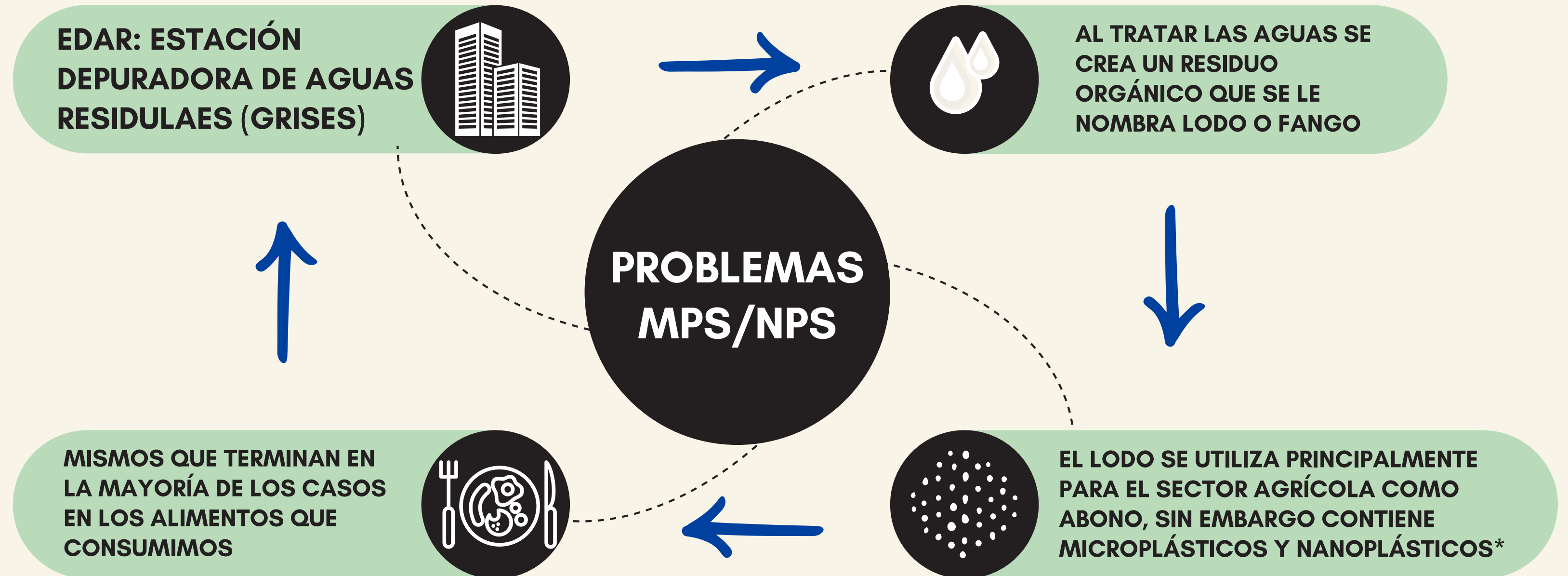
2

1

Nº Artículos MPs / NPs en la Salud Humana / Cáncer

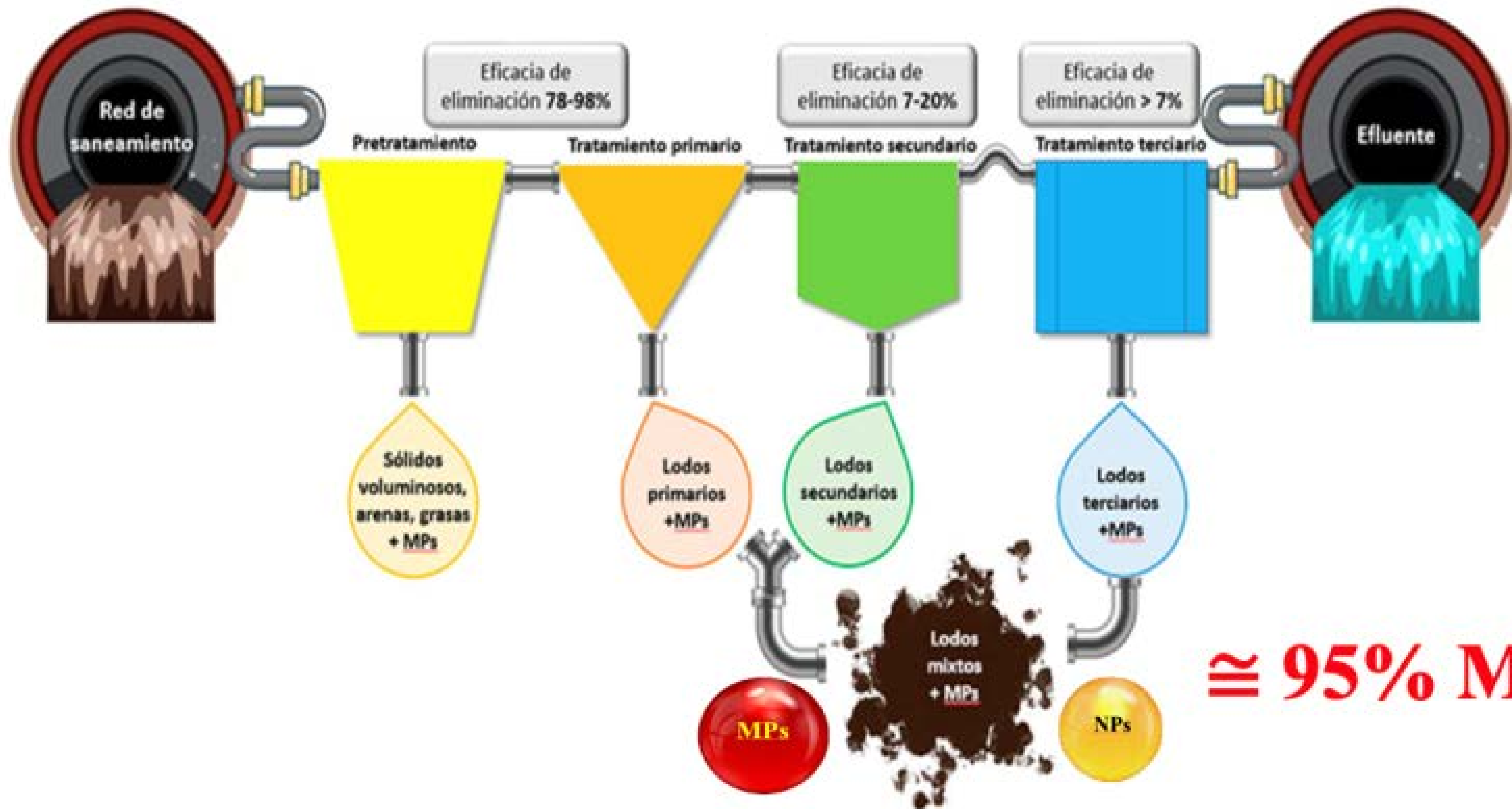


ABORDAJE INICIAL DEL PROBLEMA



*MICROPLÁSTICOS 5 MM

*NANOPLÁSTICOS 0.1 µm



$\approx 95\%$ MPs

SECTORES AFECTADOS

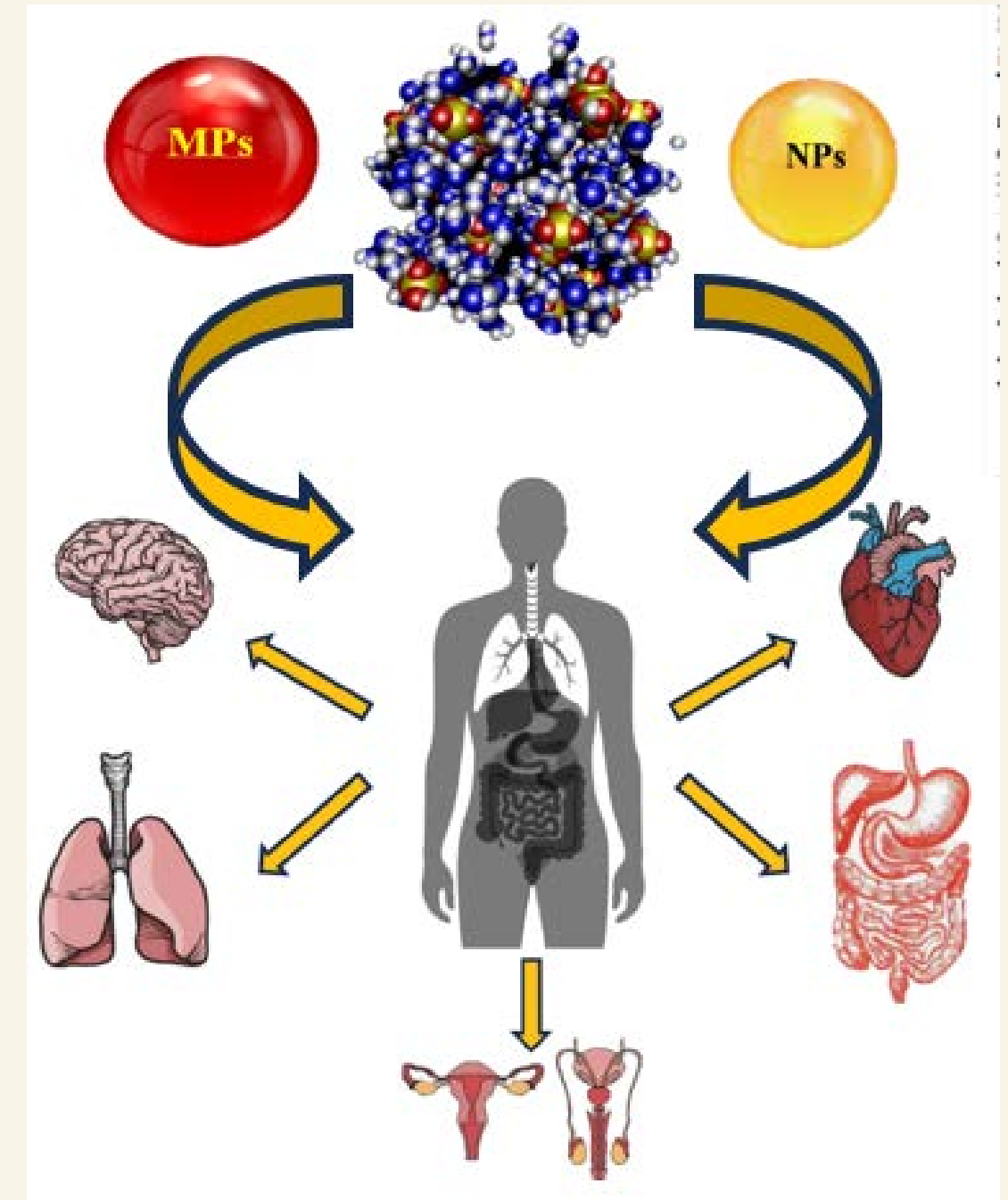
MEDIOAMBIENTALES



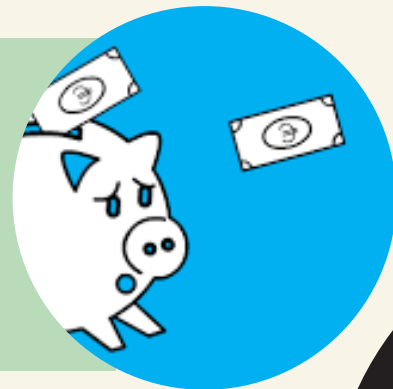
AGRÍCULTURA Y GANADERÍA



SALUD HUMANA



LODO TIENE DOBLE
COSTE PARA PLANTA
EDAR
(RETIRO Y
DESHIDRATADO)
COGERSA



CUESTIONES A RESOLVER



VECTOR DE
CONTAMINACIÓN
INDIRECTA



VACÍO LEGISLATIVO DE
SALUD EN LA UNIÓN
EUROPEA E
INTERNACIONAL

USUARIOS/CLIENTES

SECTOR PÚBLICO

LAS 5 EDARES MÁS
GRANDES DE
ASTURIAS

EDAR VILLAPEREZ
42%

EDAR BAIÑA
10%

EDAR FRIERES
8%

EDAR MAQUA
7%

EDAR SAN CLAUDIO
5%

AYUNTAMIENTOS

COGERSA



GOBIERNO DEL
PRINCIPADO DE ASTURIAS



ADMINISTRACIÓN
LOCAL

USUARIOS/CLIENTES

SECTOR PRIVADO

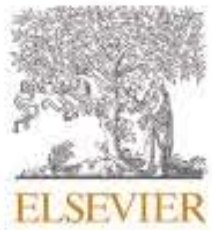
**AGRÍCOLAS Y
GANADERAS**

**BIOREFINERÍAS VERDES
(BIOGAS, BIOFERTILIZANTES,
BIOHIDRÓGENO)**



PRODUCTO INNOVADOR

Marine Pollution Bulletin 186 (2023) 114369



Contents lists available at ScienceDirect

Marine Pollution Bulletin

journal homepage: www.elsevier.com/locate/marpolbul



A stable isotope assay with ^{13}C -labeled polyethylene to investigate plastic mineralization mediated by *Rhodococcus ruber*

Maike Goudriaan^{a,*}, Victor Hernando Morales^{a,b}, Marcel T.J. van der Meer^a, Annelieke Mets^a, Rachel T. Ndhlovu^a, Johan van Heerwaarden^a, Sina Simon^c, Verena B. Heuer^c, Kai-Uwe Hinrichs^c, Helge Niemann^{a,d,e,*}

Environmental
Science & Technology

pubs.acs.org/est

Open Access

This article is licensed under [CC-BY 4.0](https://creativecommons.org/licenses/by/4.0/)

Article

Adding Depth to Microplastics

Margherita Barchiesi, Merel Kooi, and Albert A. Koelmans*



Cite This: *Environ. Sci. Technol.* 2023, 57, 14015–14023



Read Online

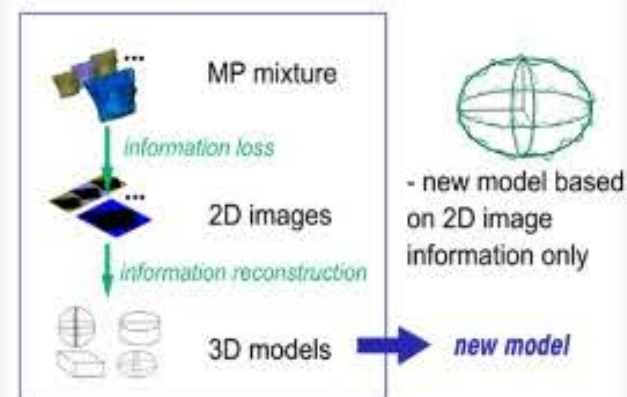
ACCESS |

Metrics & More

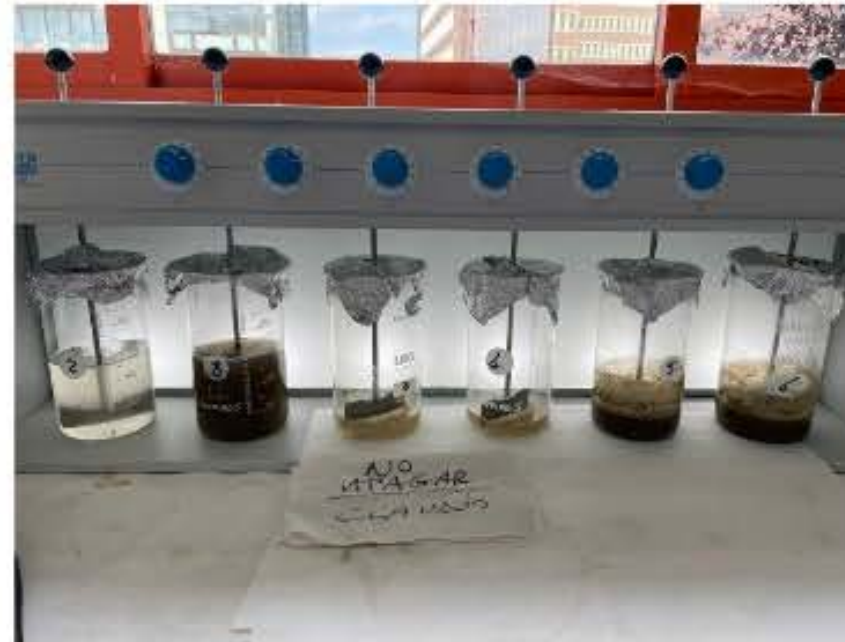
Article Recommendations

Supporting Information

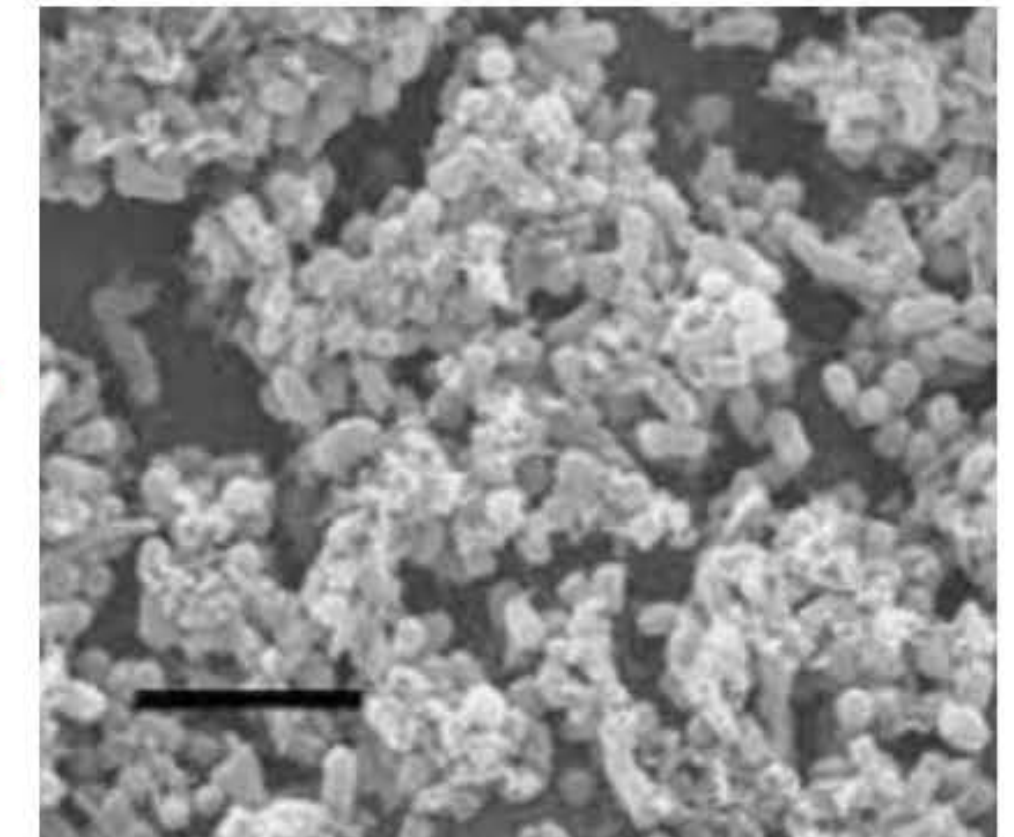
ABSTRACT: The effects and risks of microplastics correlate with three-dimensional (3D) properties, such as the volume and surface area of the biologically accessible fraction of the diverse particle mixtures as they occur in nature. However, these 3D parameters are difficult to estimate because measurement methods for spectroscopic and visible light image analysis yield data in only two dimensions (2D). The best-existing 2D to 3D conversion models require calibration for each new set of particles, which is labor-intensive. Here we introduce a new model that does not require calibration and compare its performance with existing models, including calibration-based ones. For the evaluation, we developed a new method in which the volumes of environmentally relevant microplastic mixtures are estimated in one go instead of on a cumbersome particle-by-particle basis. With this, the new Barchiesi



Electrocoagulación



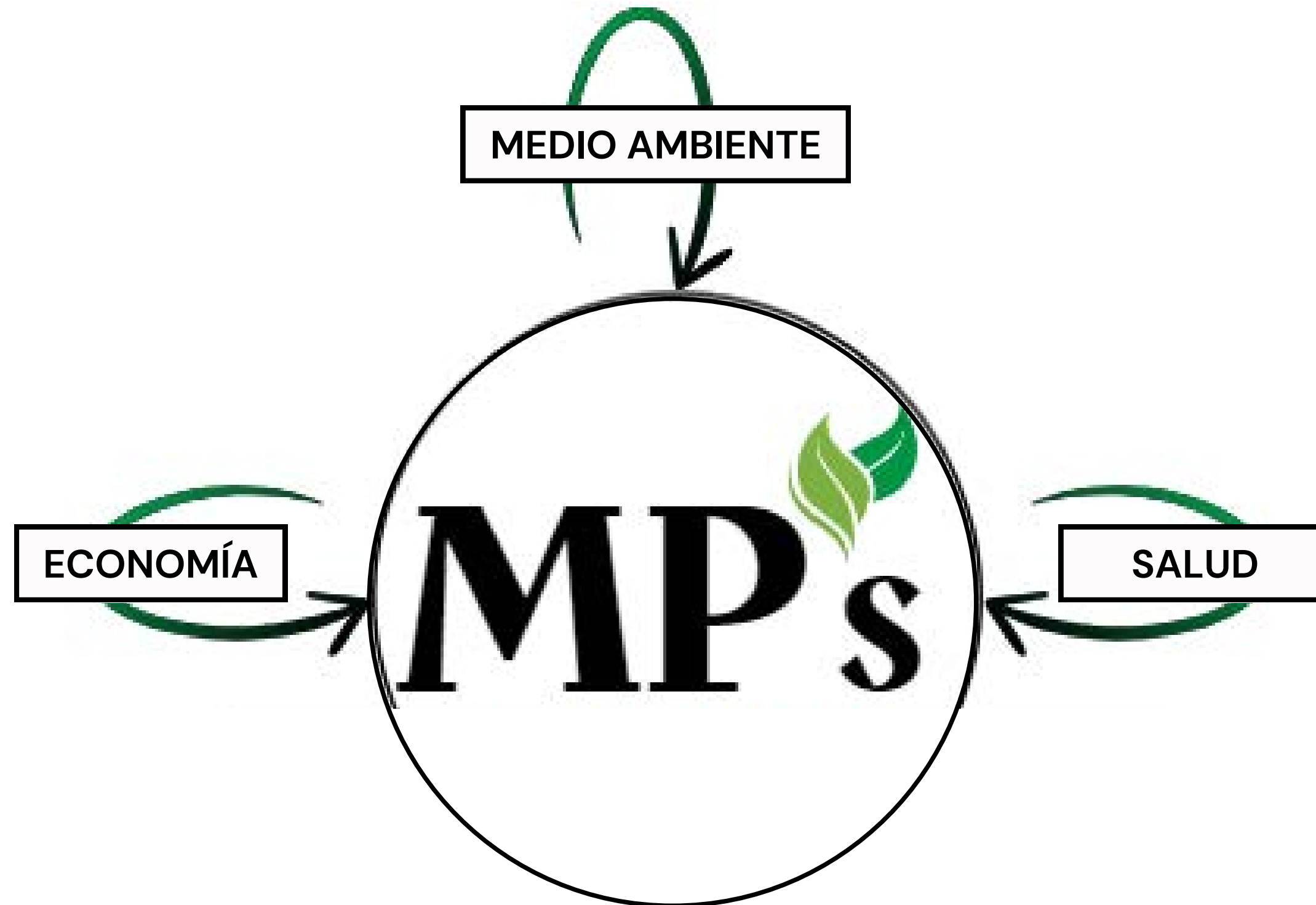
Rhodococcus ruber



PRESUPUESTO EDAR

	<u>AÑO 0</u>	<u>AÑO 1</u>	<u>AÑO 2</u>		<u>TOTAL</u>
<u>INVERSIÓN INICIAL</u>					
Implementación del sistema de electrocoagulación	30,000 €		30,000 €		60,000 €
Bacterias	4,800 €	4,800 €	4,800 €		14,400 €
Total de inversión inicial					74,400 €
<u>MPs solution</u>					
Asesoramiento y evaluación	140,000 €	140,000 €	140,000 €		420,000 €
Total de inversión	174,800 €	144,800 €	174,800 €		494,400 €
<u>GENERACIÓN DE INGRESOS</u>					
Biogas (100€/ton)	100,000 €	105,000 €	110,250 €		315,250 €
Biofertilizantes (100€/ton)	100,000 €	105,000 €	110,250 €		315,250 €
Biohidrógeno (100€/ton)	100,000 €	105,000 €	110,250 €		315,250 €
Total de ingresos venta de lodos	300,000 €	315,000 €	330,750 €		945,750 €
	<u>AÑO 0</u>	<u>AÑO 1</u>	<u>AÑO 2</u>		
<u>TOTAL DE INGRESOS ANUALES</u>	125,200 €	170,200 €	155,950 €		451,350 €

PROPUESTA DE VALOR



SENTIDO A LA ECONOMÍA CIRCULAR

**CICLO DE
VIDA DE UN
RESIDUO A UN
RECURSO**

REMANUFACTURAR



01

MEDIO AMBIENTE



02

ECONOMÍA



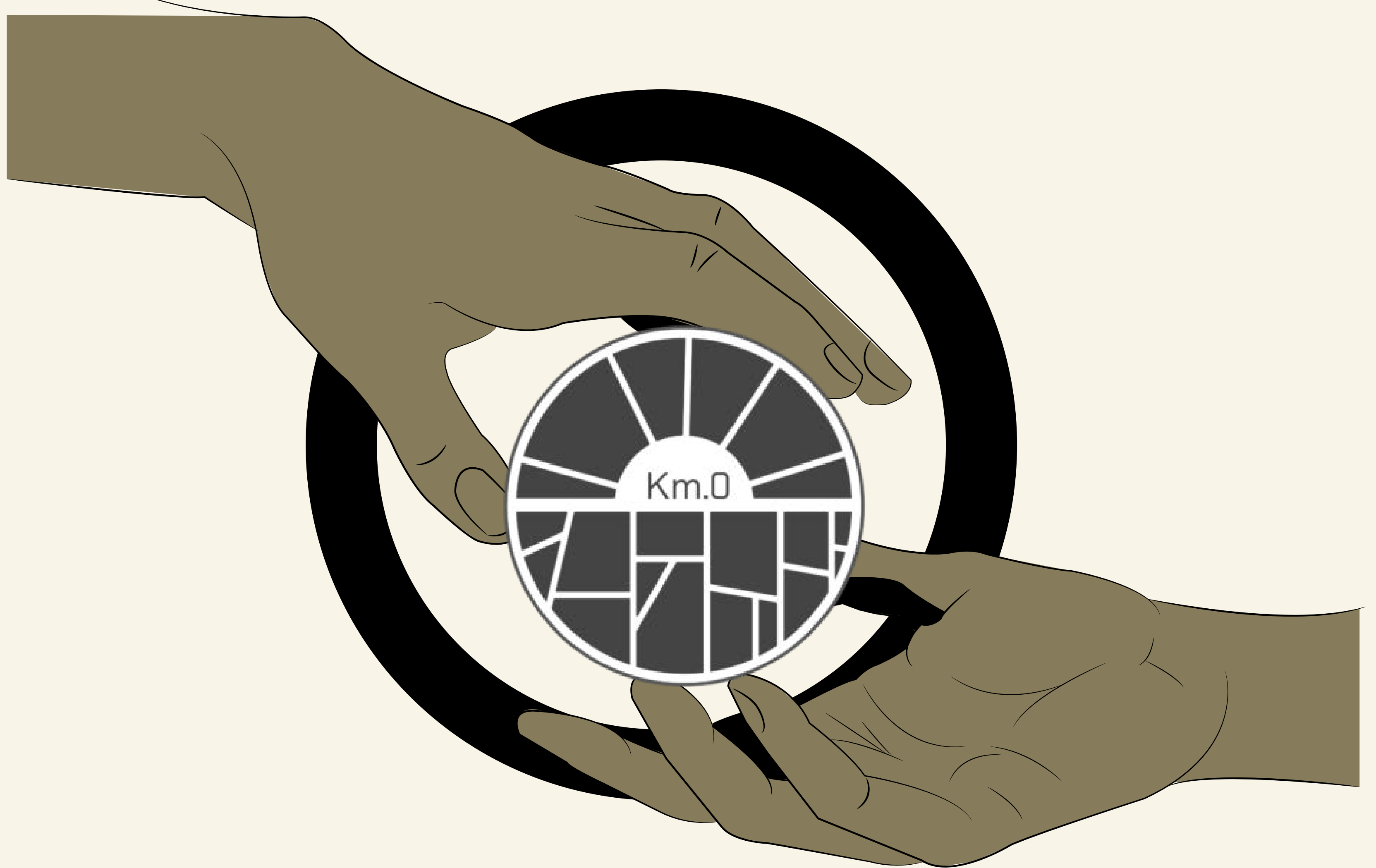
03

SALUD

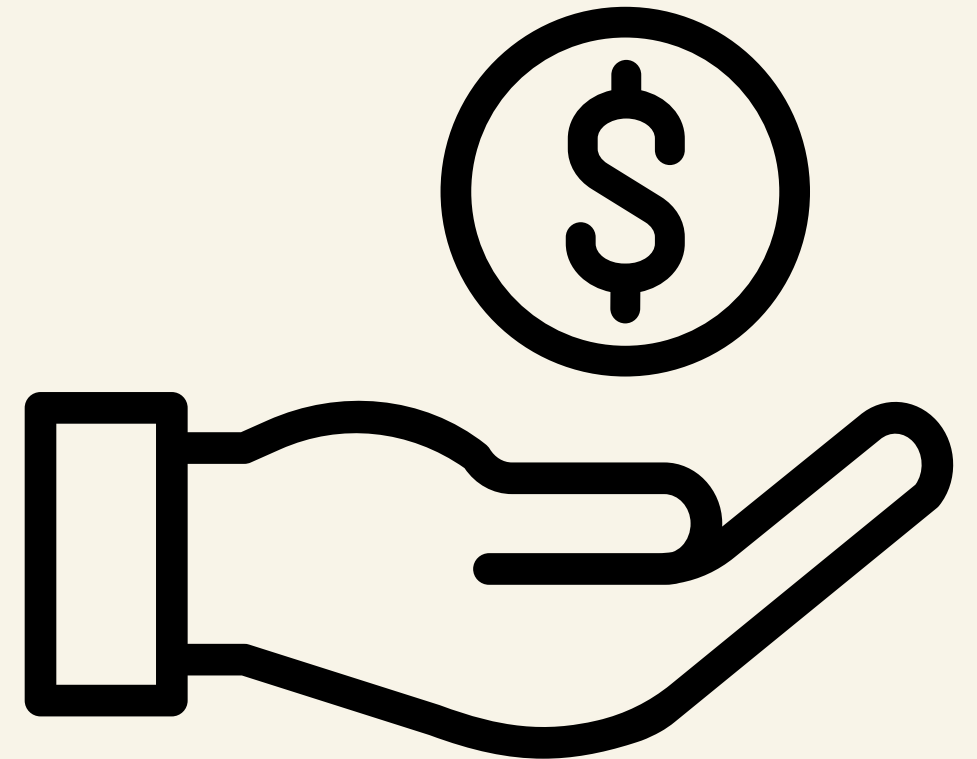
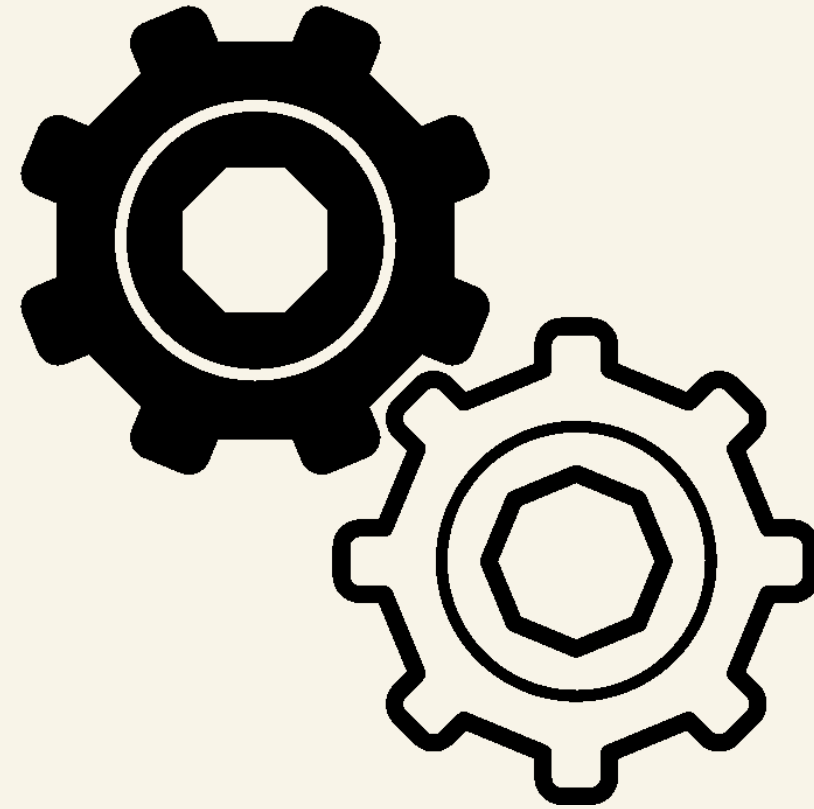
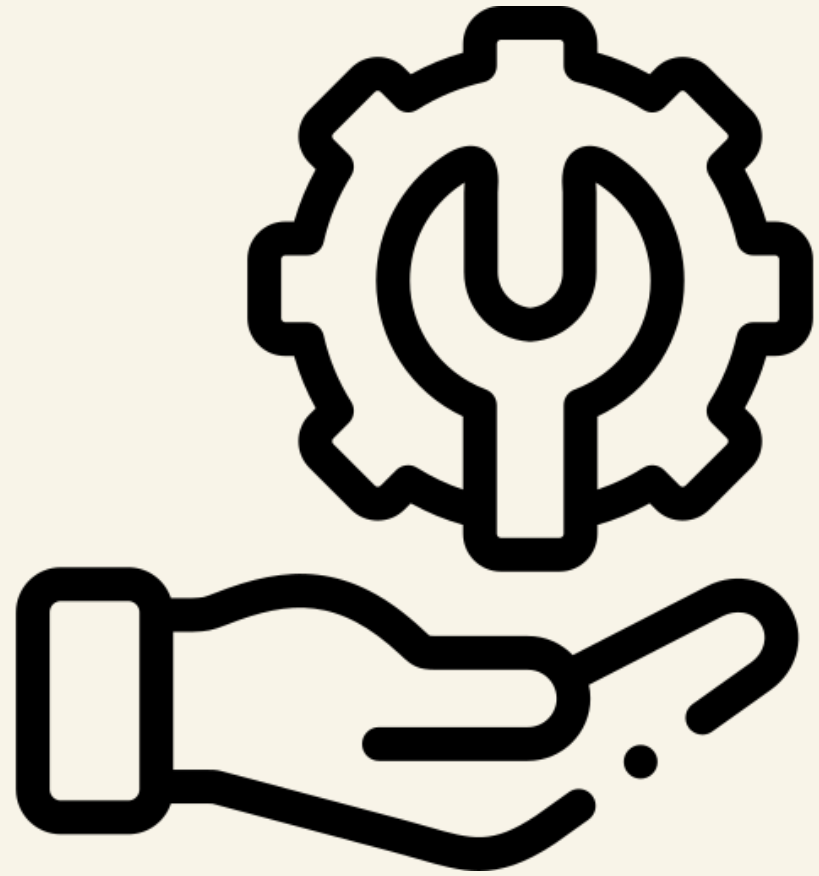


ODS

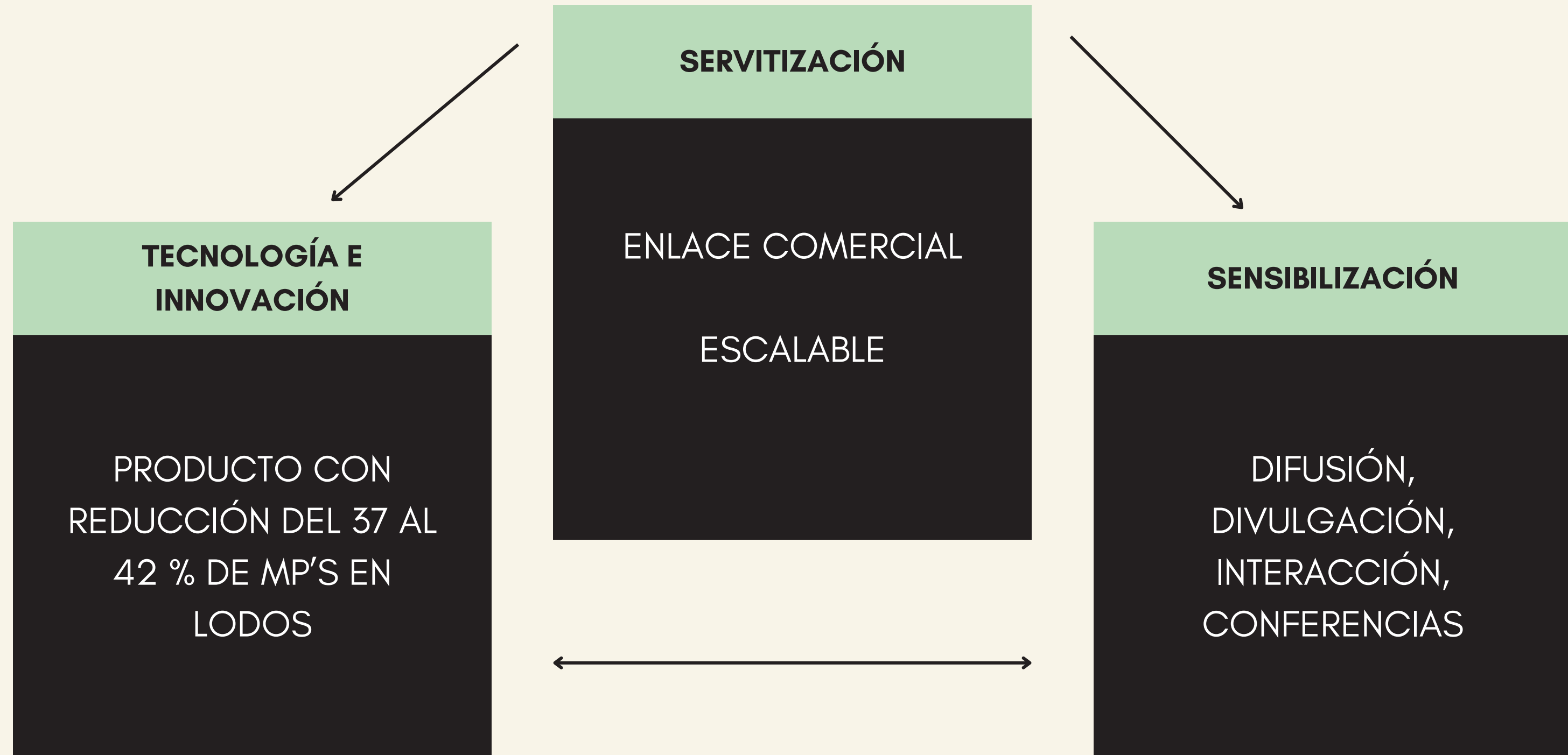




VIABILIDAD



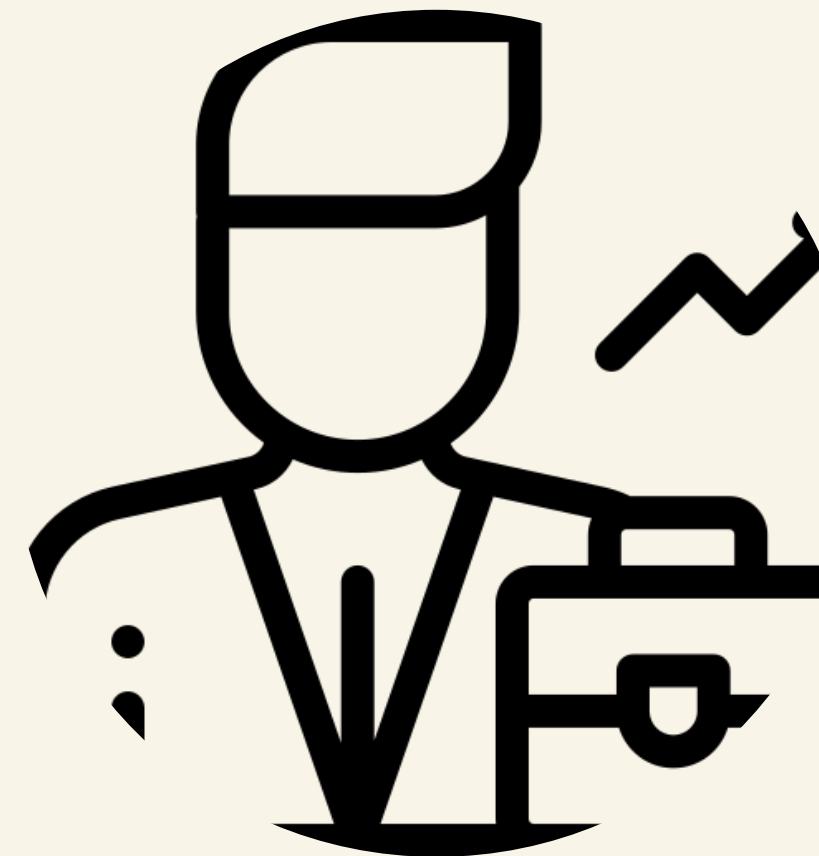
AGENCIA CONSULTORÍA TÉCNICO-CIENTÍFICA





**ARQ.
CRISTHELA HV**

**LIC.
NICOLÁS
CASTELLANOS**

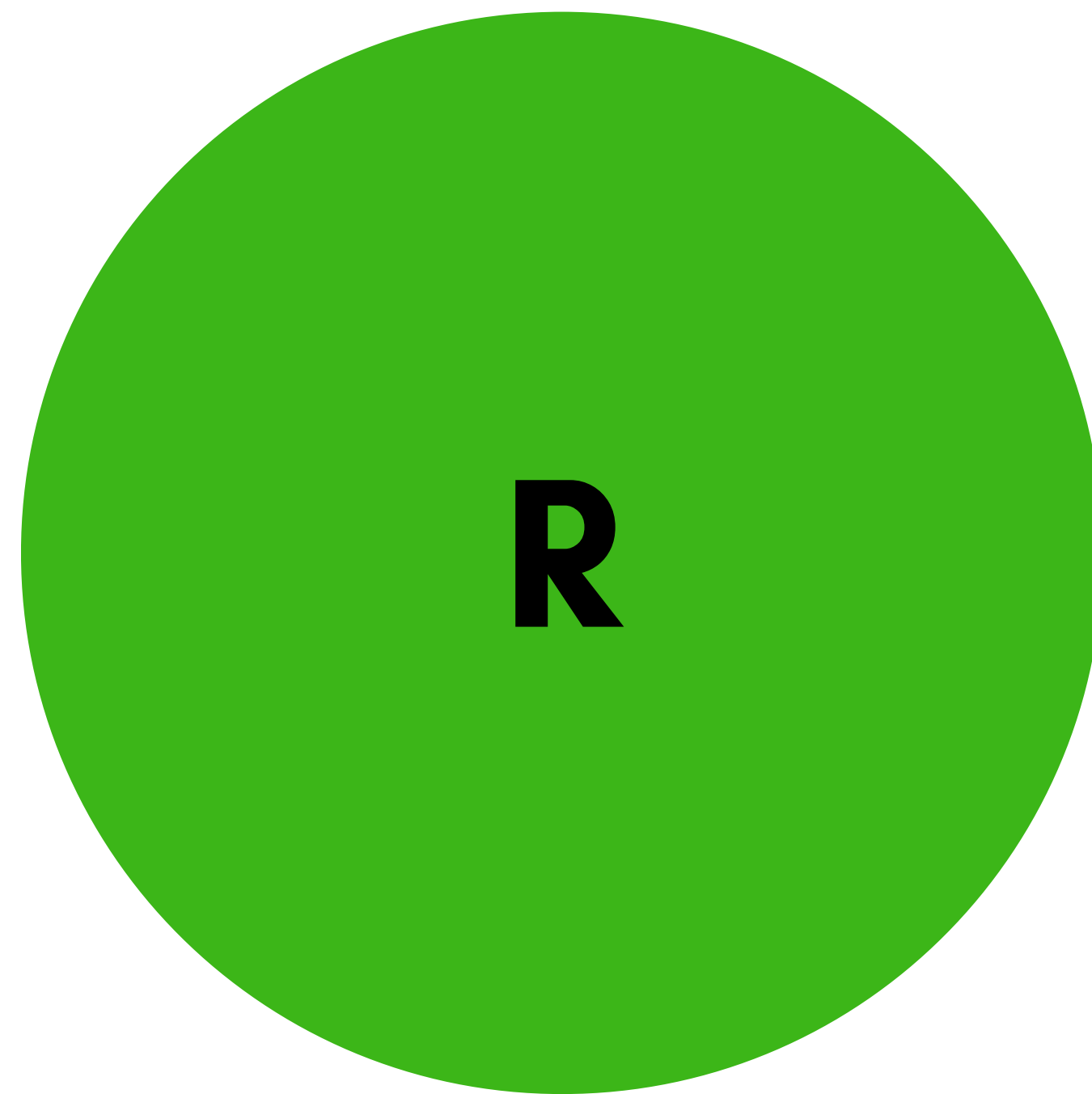
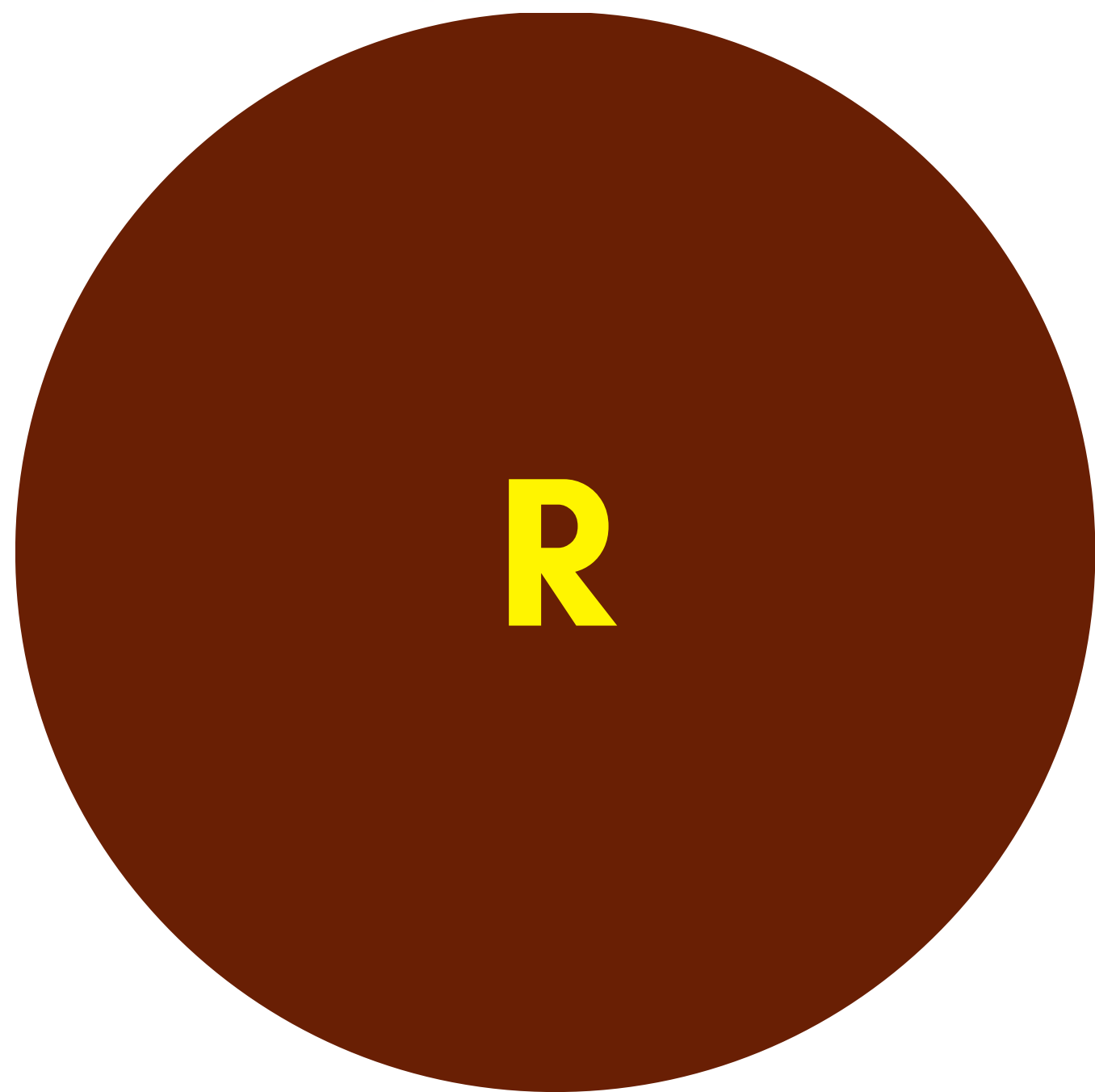


**DR.
CLAUDIO
CASELLA**

**SOCIAL
WORKER
JORGE RUÍZ**







¡GRACIAS!



Universidad de
Oviedo



Cátedra COGERSA
de **Economía Circular**



CIRCULAR WEEKEND 2023