

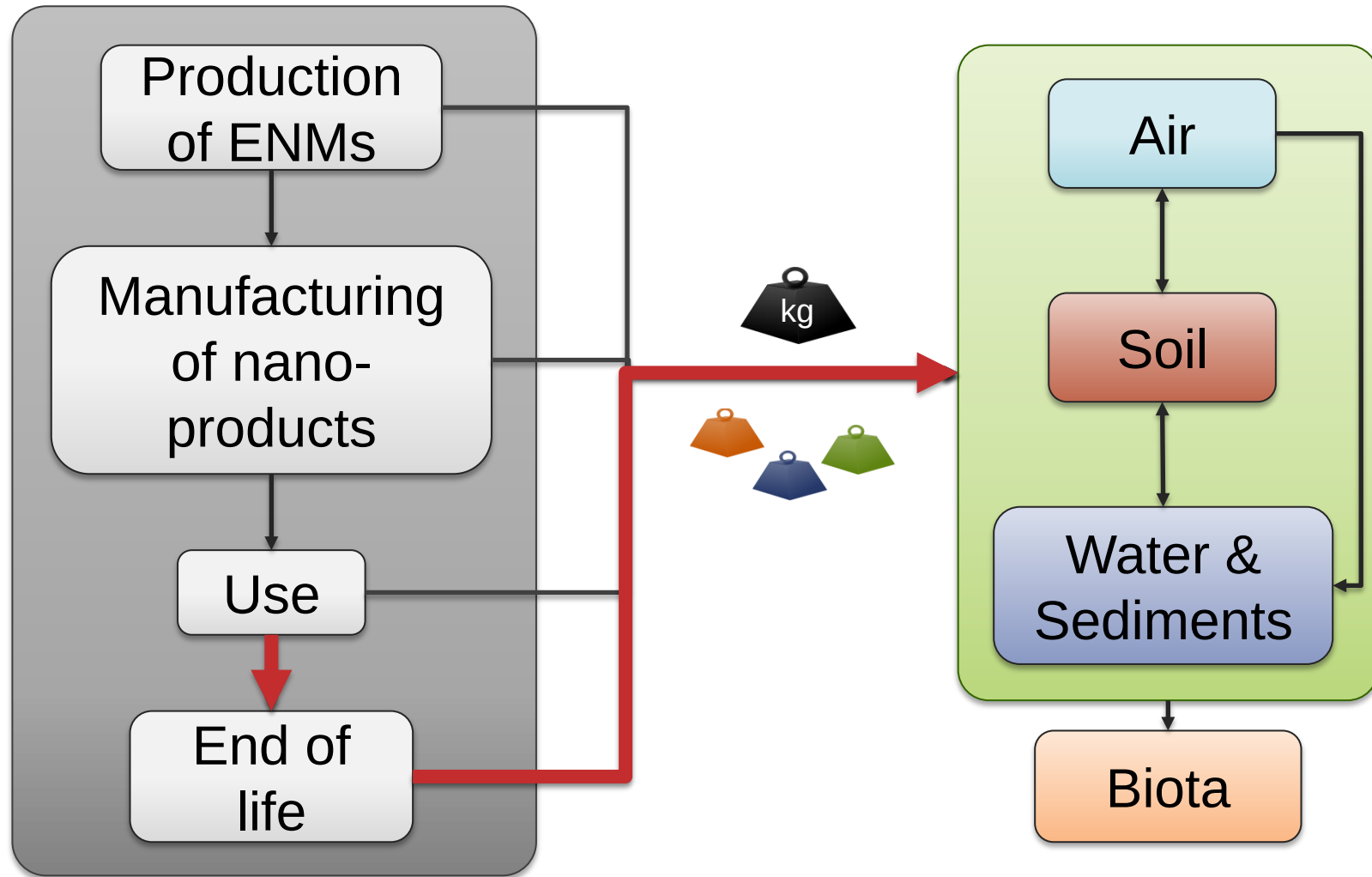
Willkommen
Welcome
Bienvenue

FLOWS OF ENGINEERED NANOMATERIALS TO WASTE TREATMENT

Véronique Adam, Fadi Sultan, Bernd Nowack

Empa – Swiss Federal Laboratories for Materials Science and Technology
St. Gallen, Switzerland

SCOPE AND OBJECTIVES

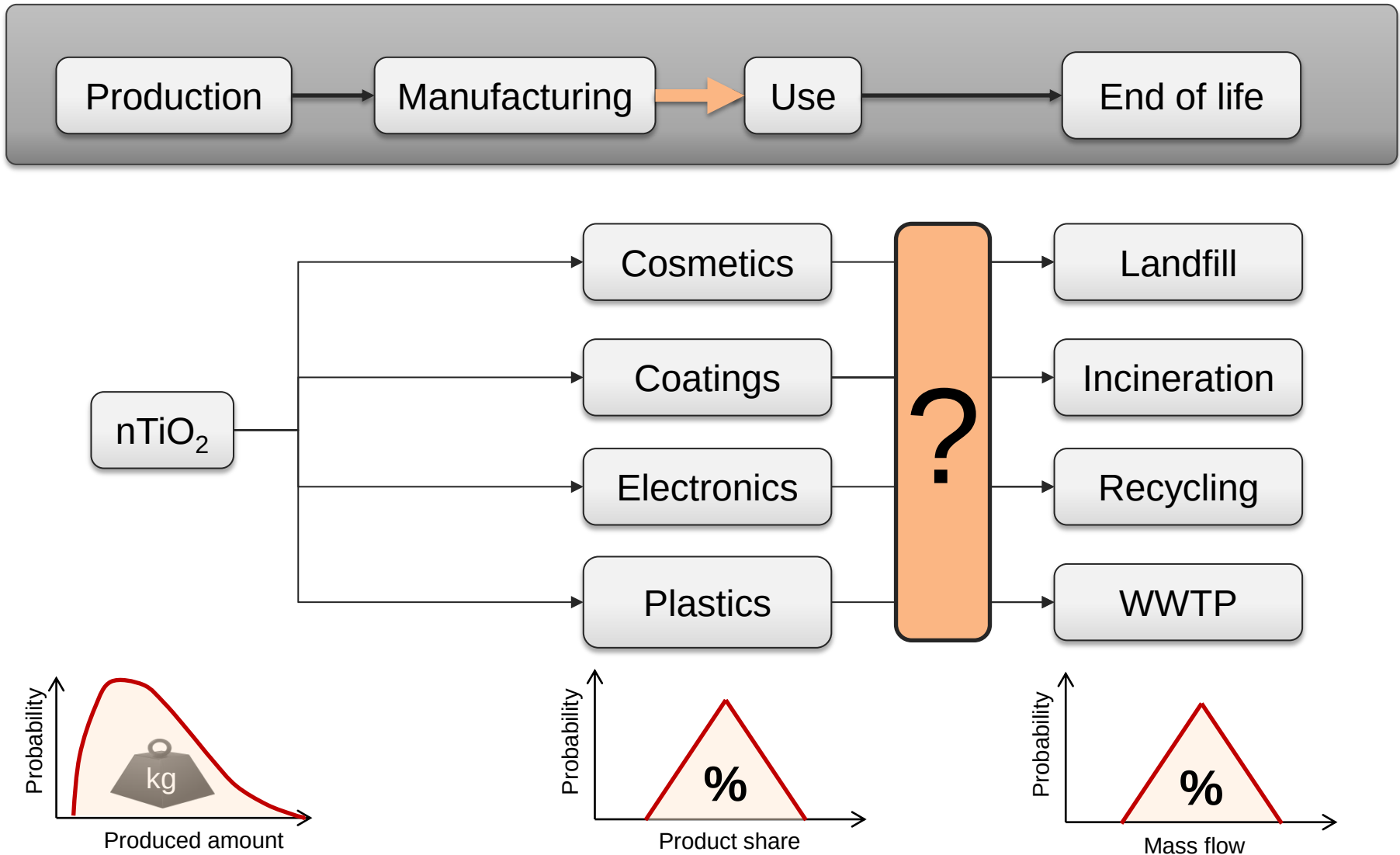


SCOPE AND OBJECTIVES

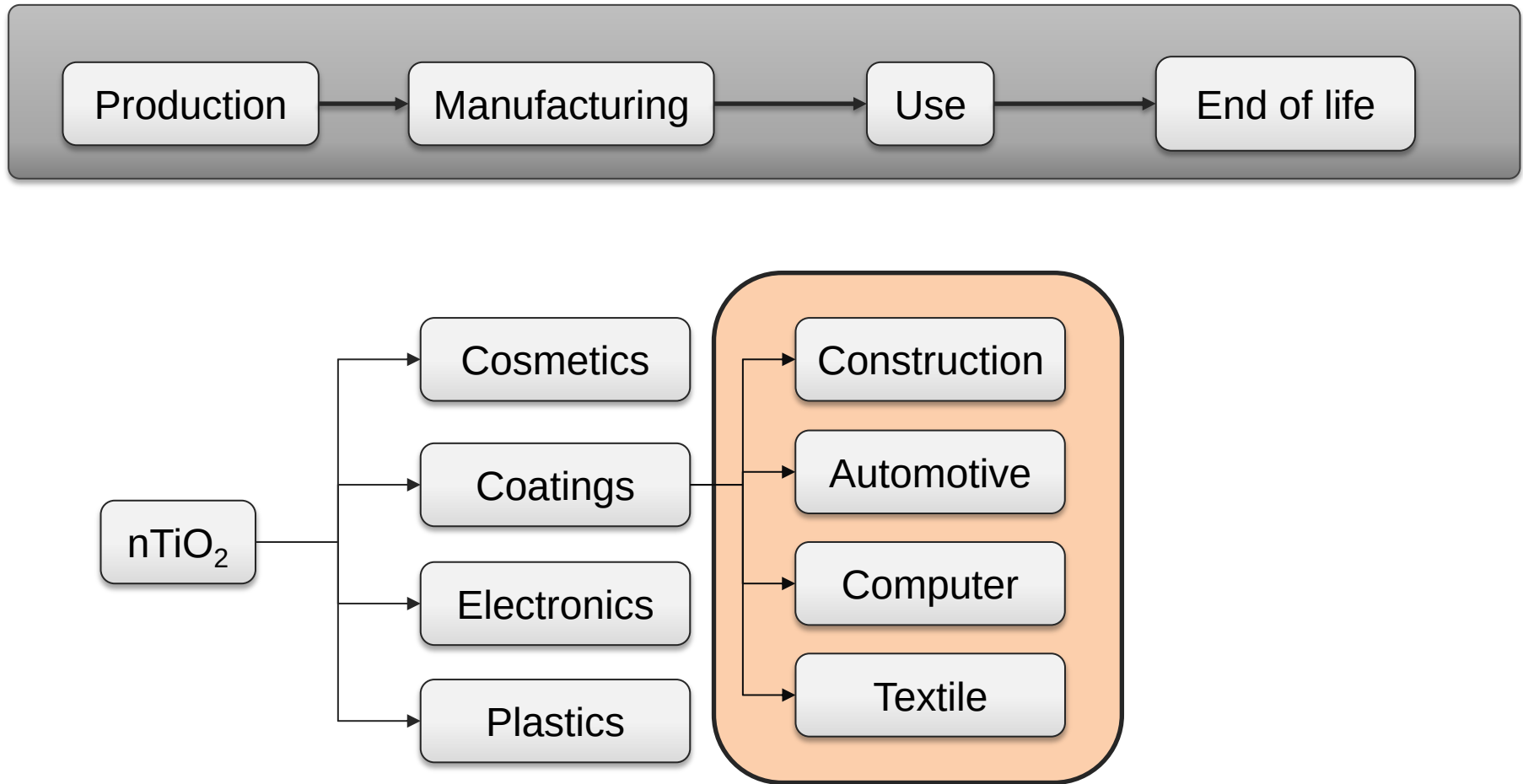


METHOD – PREVIOUS MODEL

Sun et al. 2016



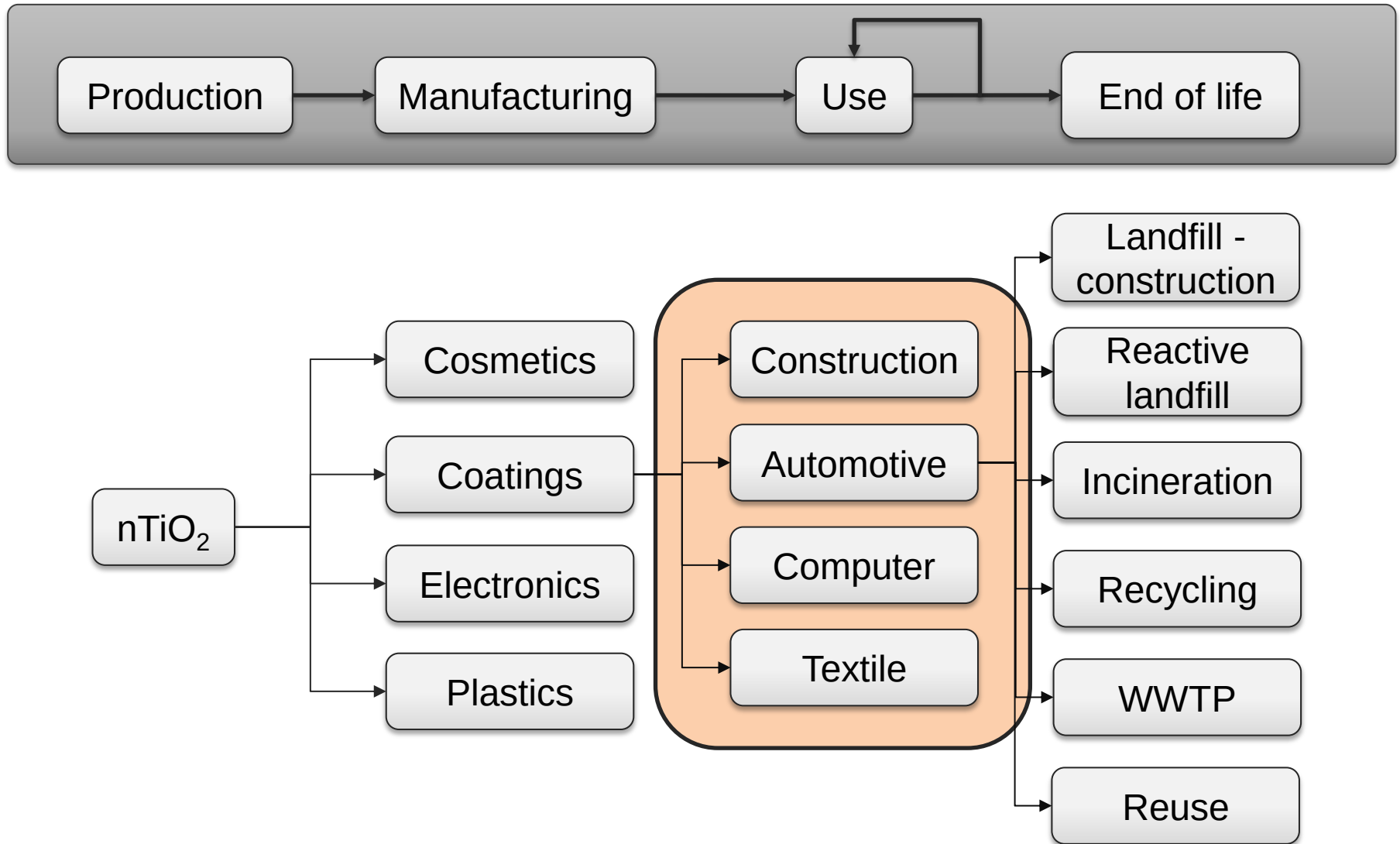
METHOD – NEW MODEL



- Various sources
 - Consumer product inventories (Nanodb,...)
 - Commercial platforms (Amazon,...)
 - Google
 - Scientific reviews

- Application of quality criteria
 - Include at least 20% of the product categories considered
 - Written/Updated since 2012

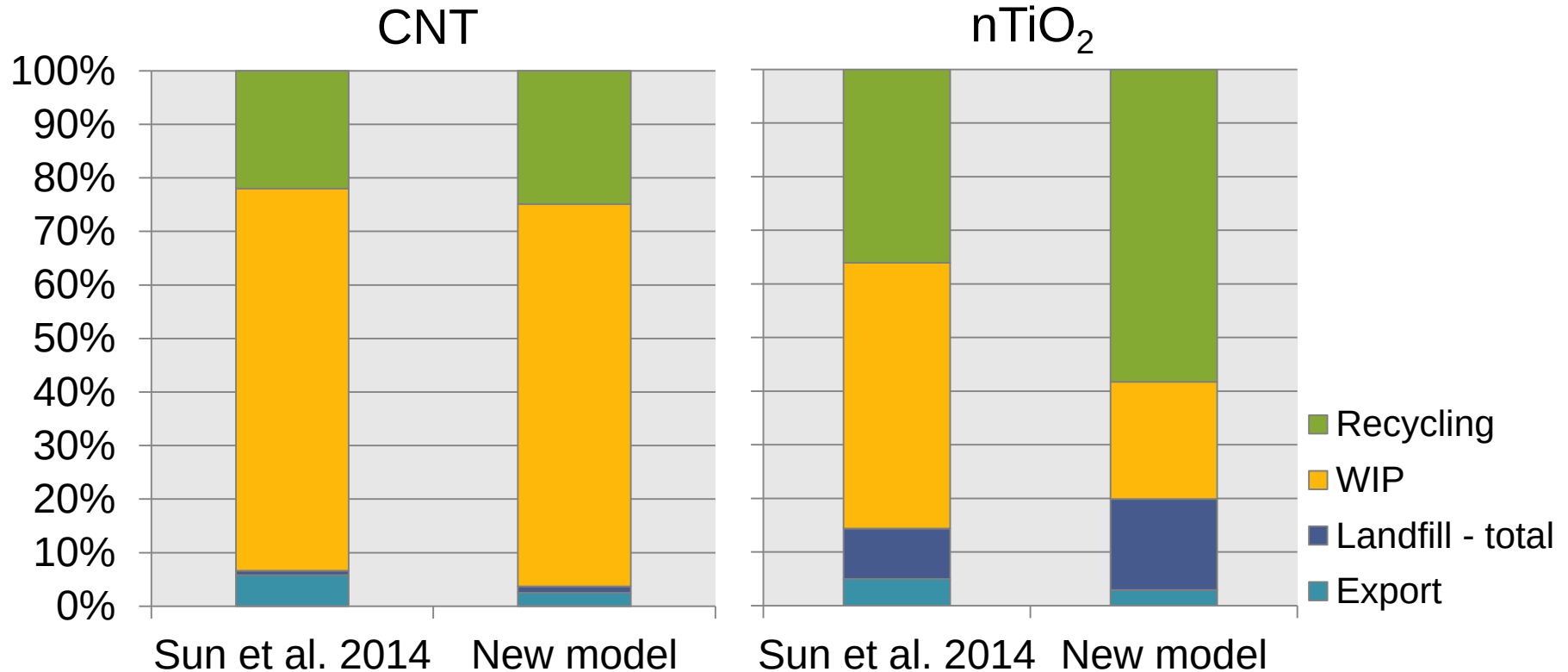
METHOD – NEW MODEL



- Various sources
 - Reports from government organisations
 - Eurostat database

- Data (un)availability
 - Different years of reference
 - Different waste categories

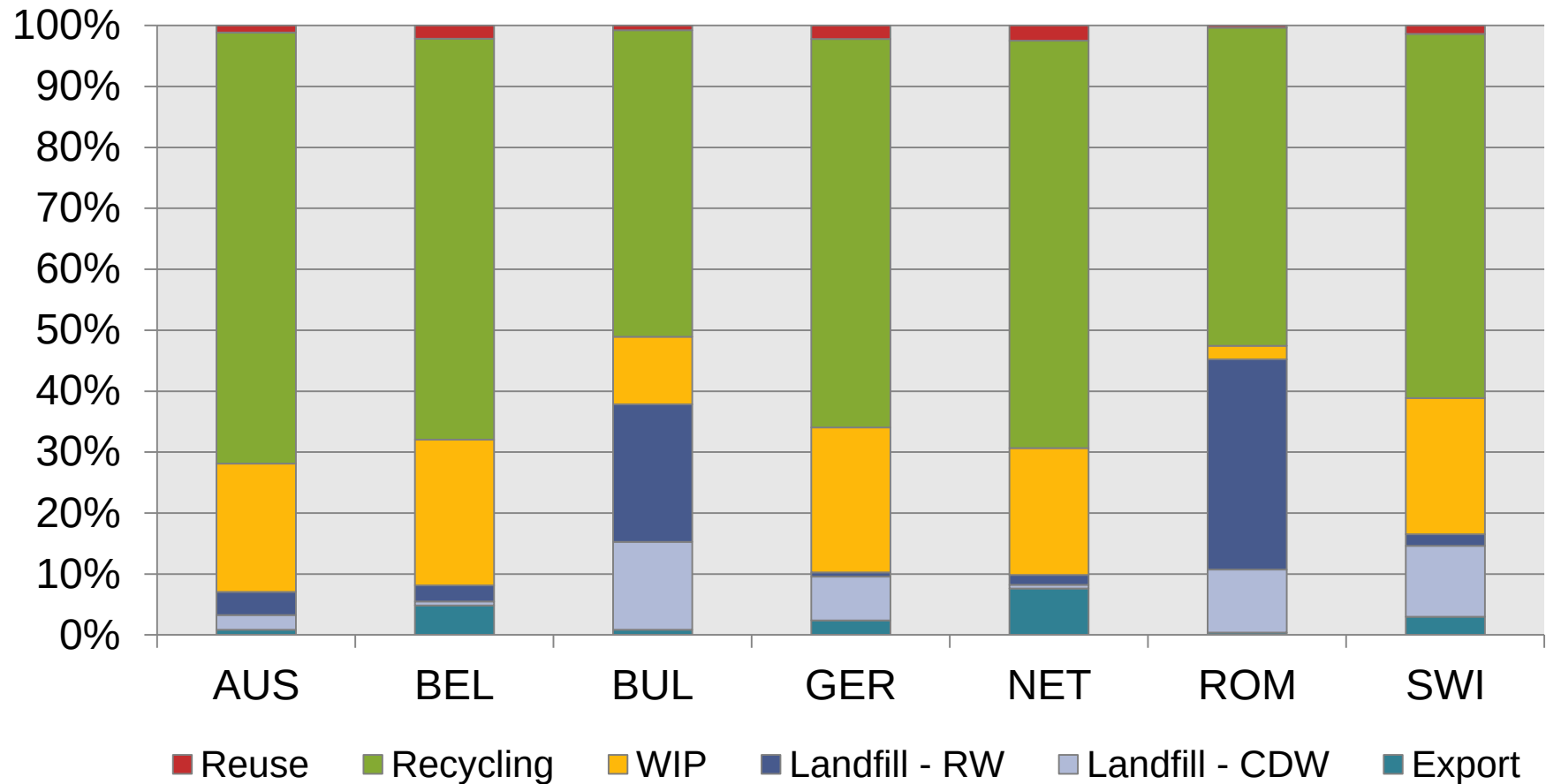
Normalised flows



- The refinement of product allocations can change the results significantly

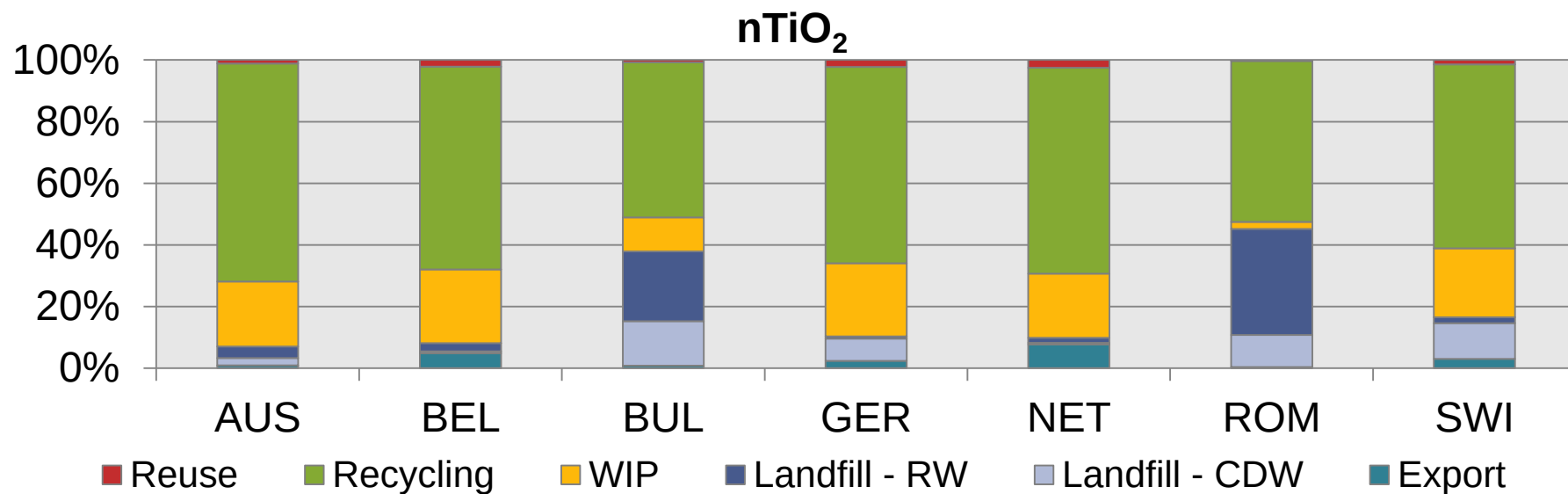
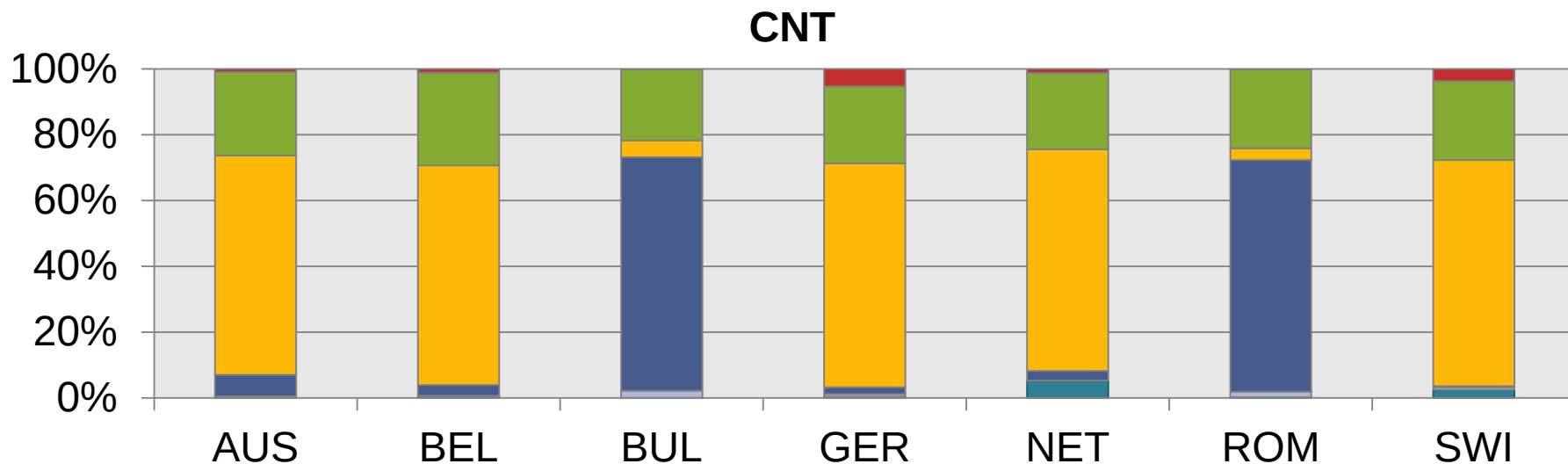
RESULTS: NTiO_2

Normalised flows



■ The national scale is relevant

RESULTS

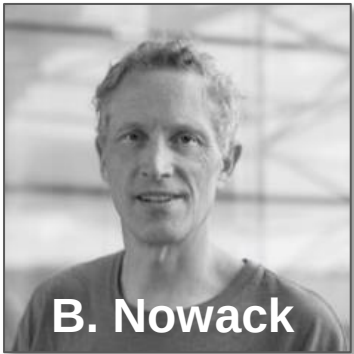


- The product allocation is a crucial step
- The national scale is more relevant than the European scale
- Shares to recycling are the highest
 - Focus on these processes when assessing the flows out
- Forms of the outflows:
 - Pristine
 - Matrix-embedded
 - Transformed
 - Dissolved

THANK YOU!



Materials Science & Technology



B. Nowack



A. Caballero



F. Sultan



Y. Wang