Looking Forward to 2030: Nitrogen and the Sustainable Development Goals

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7th International Nitrogen Conference
4-8 December 2016, Melbourne

The global economy will continue to double in size every generation.

Economic Development

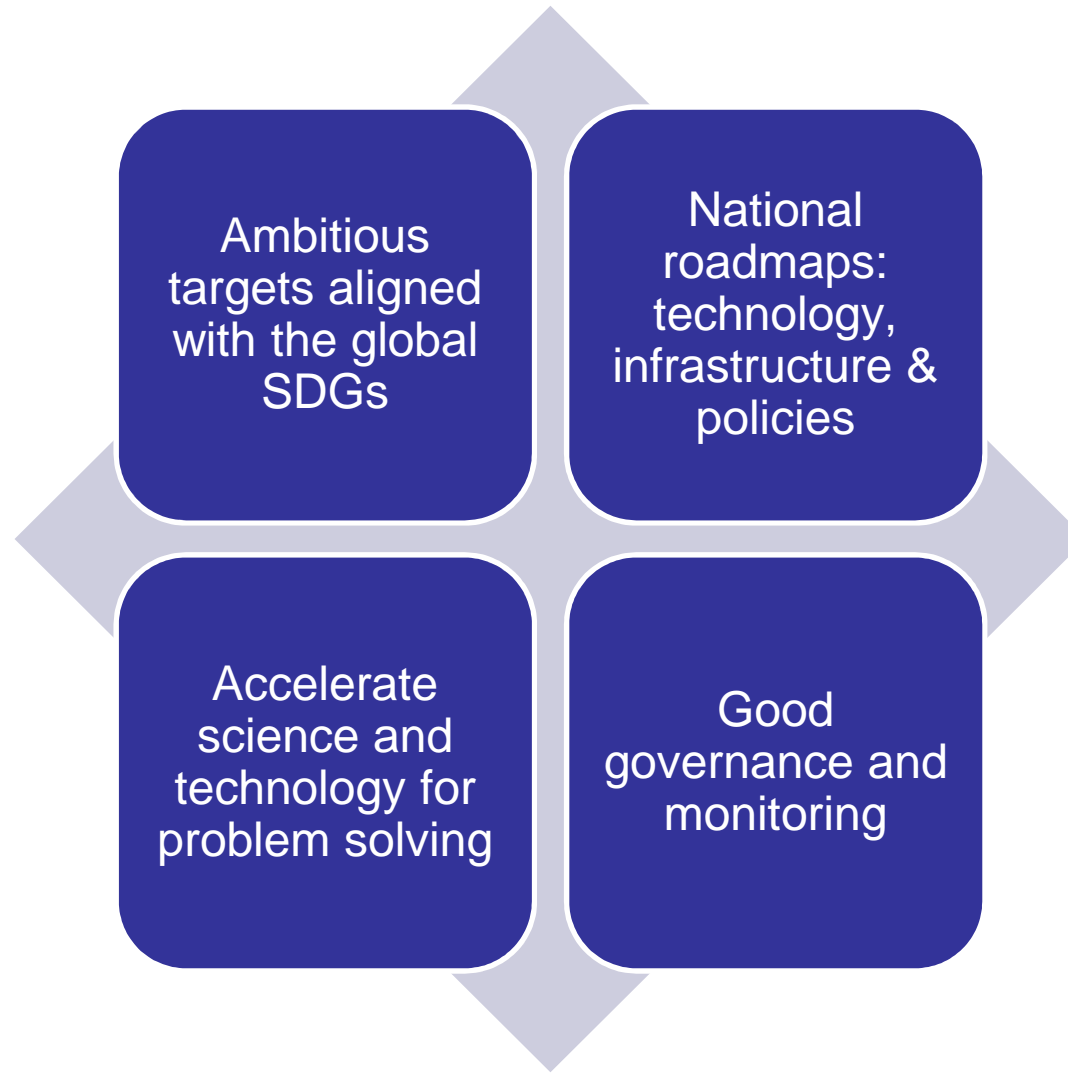**Social Inclusion**

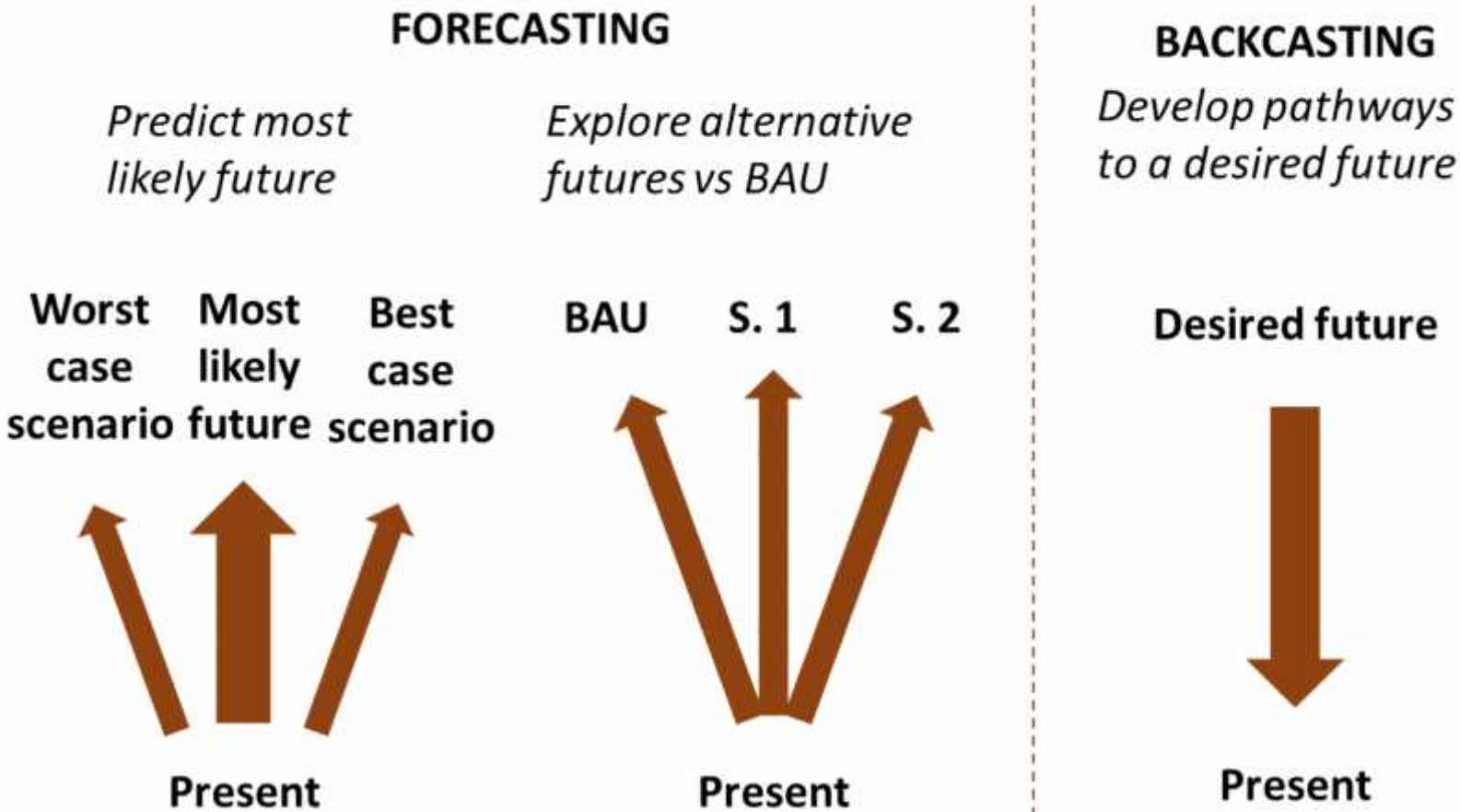**Environmental Sustainability**

Good Governance

Historical UN Summit in Sep 2015: 17 SDGs with 169 Targets
https://sustainabledevelopment.un.org/sdgs

Long-term pathways for action

Ambitious targets aligned with the global SDGs

National roadmaps: technology, infrastructure & policies

Accelerate science and technology for problem solving

Good governance and monitoring

SDSN Agricultural Transformation Pathways Initiative

FORECASTING

Predict most likely future

Explore alternative futures vs BAU

Worst case scenario | Most likely future | Best case scenario

BAU | S. 1 | S. 2

Present

Present

BACKCASTING

Develop pathways to a desired future

Desired future

Present

http://unsdsn.org/resources/publications/agricultural-transformation-pathways-initiative-2016-report/

SUSTAINABLE DEVELOPMENT
SOLUTIONS NETWORK
A GLOBAL INITIATIVE FOR THE UNITED NATIONS

SDSN Agricultural Transformation Pathways Initiative

1

Describe the present situation
Evaluate the main agricultural sectors and the main environmental,
social and economic challenges needed to ensure sustainability of this(ese) sector(s)
Select the scope of analysis

2

Build a desired future
Select indicators to monitor transformation
Set the level of ambition (end targets)

3

Check feasibility
Undertake scenario analysis
and impact analysis

4

Determine a concrete course of action
Conduct research into a course of action
Undertake scenario analysis
and impact analysis

5

Elaborate a detailed pathway
Describe implementation requirements
Assess levers and roadblocks for transformation

http://unsdsn.org/resources/publications/agricultural-transformation-pathways-initiative-2016-report/

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Ambition for agriculture in Uruguay

Uruguayan food exports as people fed per year
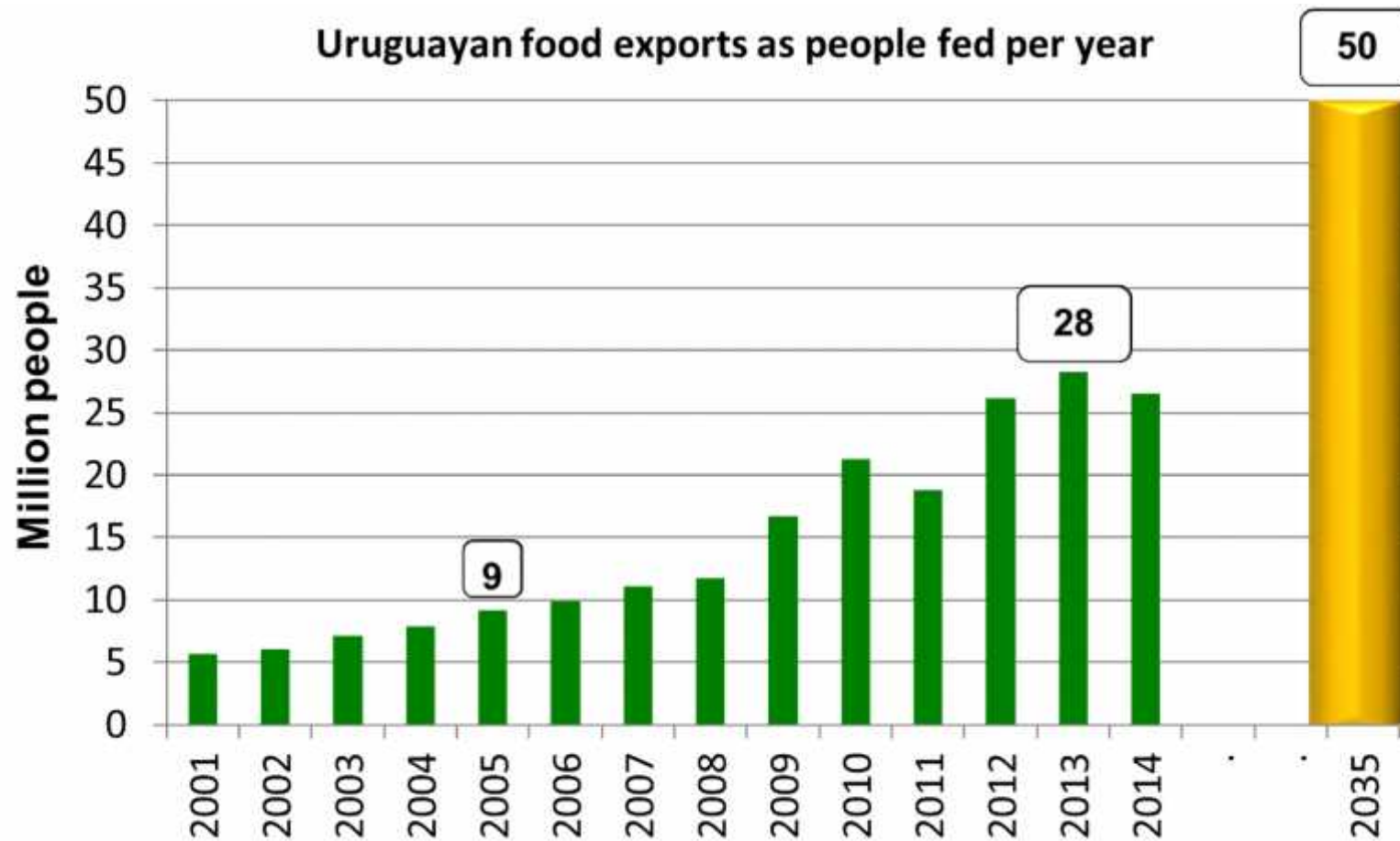
Based on calories consumption of an average consumer.

Source: OPYPA-MGAP

Beef sector

- Most important agricultural sector
  - Half of ag GDP
  - 70% is exported = 5% globally traded beef ($1.5 bln)
- Large environmental footprint
  - 2/3 of land surface → NO_3 leaching, erosion, biodiversity loss
  - 75% GHG emissions (mainly methane, nitrous oxide)
- Intl. reputation: "Uruguay Natural" brand: grass-fed, zero antibiotics/hormones, traceable animals

Kanter et al. 2016. Translating the Sustainable Development Goals into action: A participatory backcasting approach for developing national agricultural transformation pathways. Global Food Security 10:71-79

Beef sector

- BAU risks:
  - Intensification with feedlots and manure excess
  - Conversion of pastureland into cropland (for feed)→ water pollution, biodiversity loss, GHG, soil erosion
  - Loss of high-value product – reduction in family farms and rural jobs

Chart a better pathway, in line with SDGs?

Kanter et al. 2016. Global Food Security 10:71-79
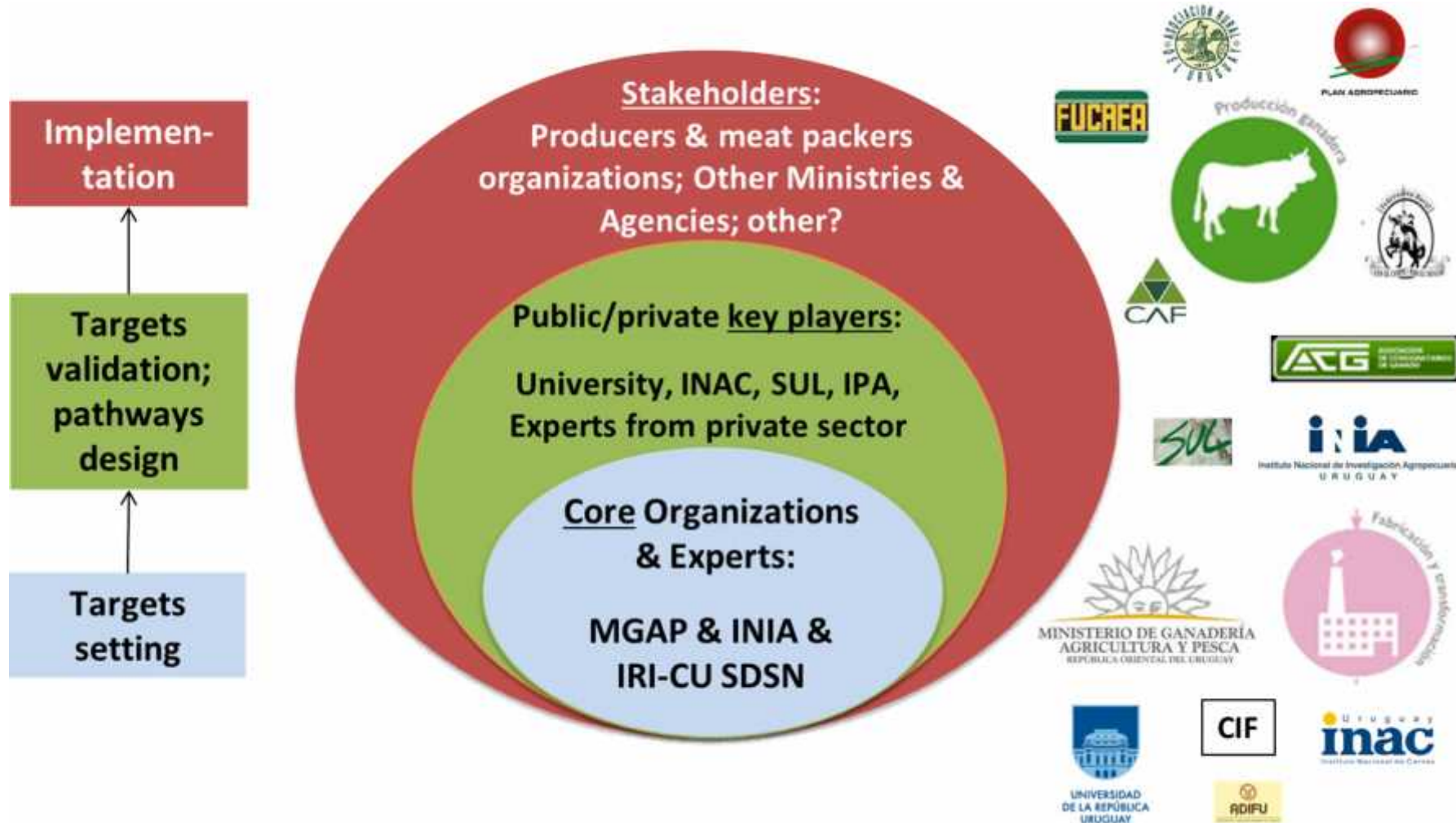
Beef sector

Kanter et al. 2016. Global Food Security 10:71-79

Beef sector

- End targets to achieve by 2030:
  - **Increase beef exports by 35%**
  - **Increase beef productivity by 25%**, but keep total herd size the same (~12 M) and avoid feedlots
- Environmental outcomes:
  - **Reduce carbon footprint**
  - **Reduce nitrogen losses**
  - **Avoid biodiversity loss**: no conversion of pasture land to crops

Kanter et al. 2016. Global Food Security 10:71-79

Beef sector

Livestock interventions:

- Decrease average slaughter age from 38 to 25 months
- Increase first pregnancy rate at 2 years old from 50 to 75%
- Reduce the average age at first pregnancy from 32 to 25 months
- Increase the weaning rate from 67 to 77%
- Increase feed supplements from 19 to 37 kg/ha

Feasible. Top farmers achieve that already

Kanter et al. 2016. Global Food Security 10:71-79

Beef sector

Pasture interventions:

Issue	Unit	Base 2014	Goal 2030	Difference
Carbon Footprint	kg CO_2 / kg LW	21	15	-25% ↓
Biodiversity Loss	AGB (million ha)	11.1	11.1	≈0%
Nitrogen Loss	kg N / kg LW	66	48	-27% ↓

Metrics	Baseline	2030 with and without additional measures				
		No A.M.	+Nitrification inhibitors	+Improved Pastures	+Trees for shade	All A.M. combined
Kg CO_2e/kg LW/year	20.8	-3.6	-0.3	-0.3	-0.9	15.5
Kg CO_2e/ha/year	2,330	-110	-40	-100	-330	1,750

Kanter et al. 2016. Global Food Security 10:71-79

Beef sector

Implementation requirements:

•Most important **roadblocks**: Human capital
  - skills and training
  - farmer's age, interests, attitudes, preferences

•Most important **levers**:
  - knowledge transfer
  - technical assistance
  - incentives (policies)

Kanter et al. 2016. Global Food Security 10:71-79

Backcast the full nitrogen chain?
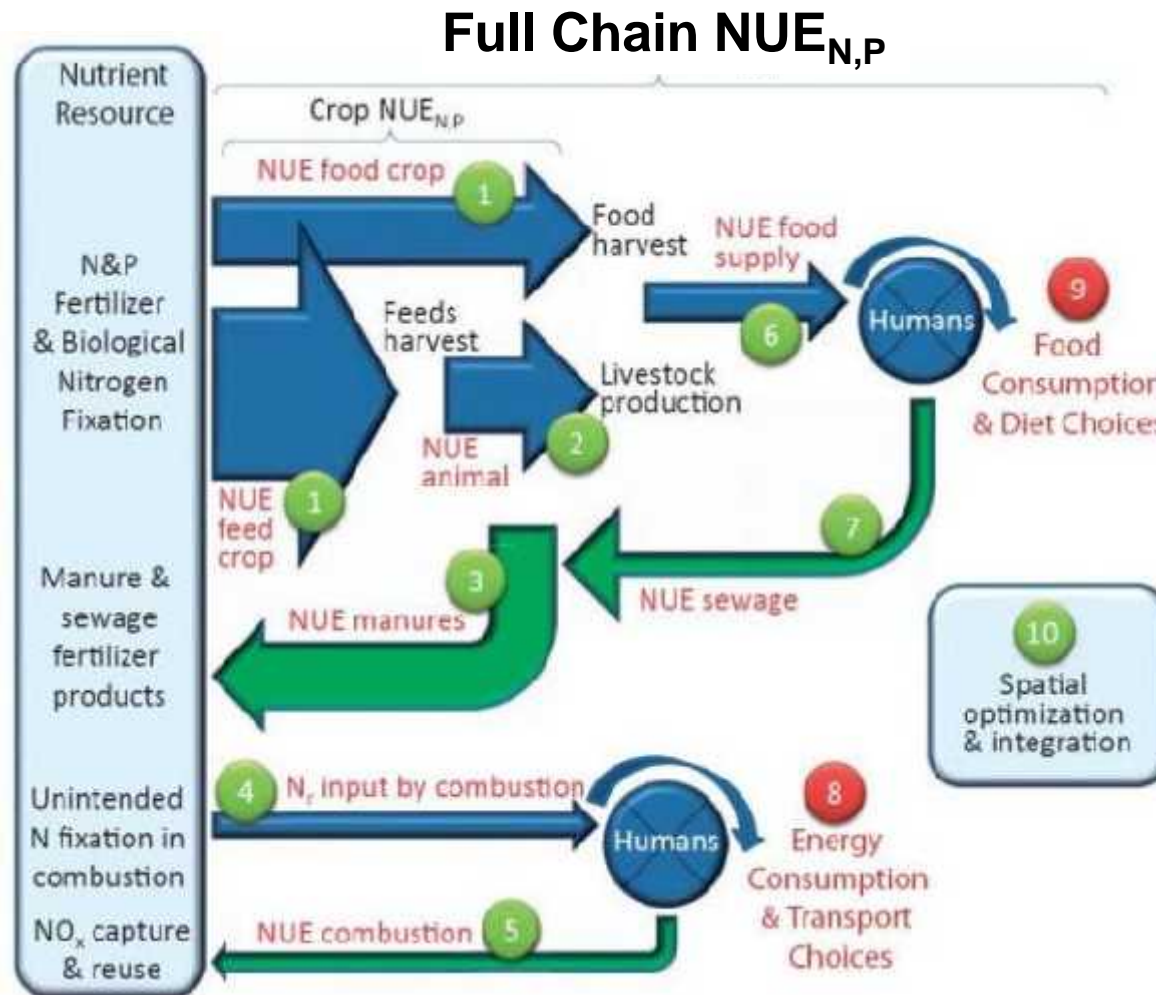
Source: Sutton, M.A. *et al.* 2012

Official UN Indicators (under discussion)
(Inter-agency Expert Group on SDG Indicators)

- **230** indicators on which general agreement has been reached
- Nothing on nutrients
- Difficult to influence
- Many poorly defined indicators and/or lacking data

http://unstats.un.org/sdgs/iaeg-sdgs
http://unstats.un.org/sdgs/indicators/indicators-list/

- A small set of **global indicators** will be used as a report card to track overall country performance
- At the **national level, national statistical agencies will track a larger number of indicators**, many of which will be relevant for specific, national contexts
- Several of those will be reported to UN agencies like WHO and FAO for **thematic monitoring on specific issues**
- At the same time, regional bodies like the EU, OAS, and CARICOM will monitor **regional progress**
- **Local stakeholders and Businesses** have their own KPIs

EU Nitrogen Expert Panel

Science

Practice

- To improve linkages
- To get things done

EU Nitrogen Expert Panel

Policy

Industry
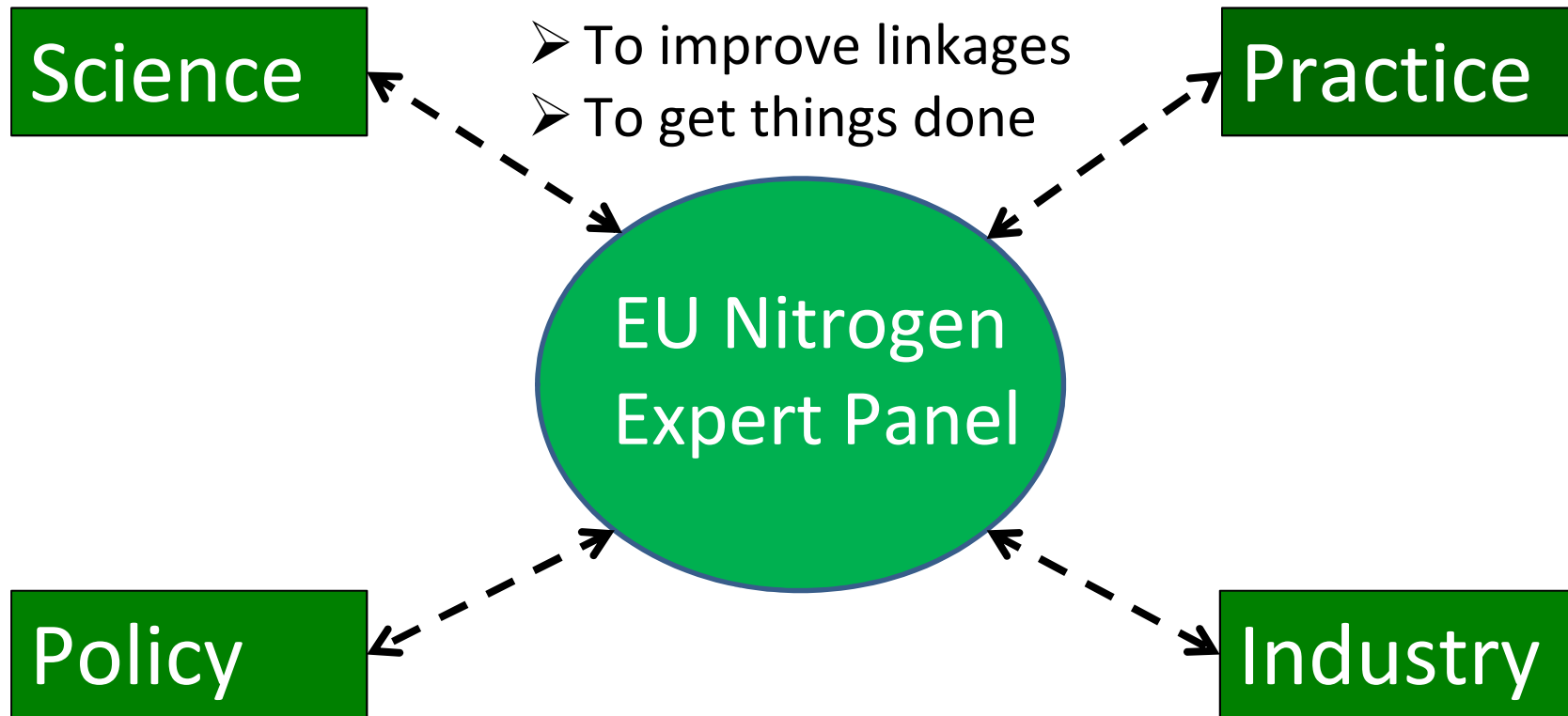
www.eunep.com

NUE indicator

Suggested reference values are tentative

NUE = 90%

NUE very high (NUE > 90%): Risk of soil mining

Desired maximum N surplus < 80 kg/ha/yr

Desirable range for NUE, N output and N surplus

NUE = 50%

Desired minimum productivity (N output > 80 kg/ha/yr)

NUE very low (NUE < 50%): Risk of inefficient N use

N output, kg/ha/yr

N input, kg/ha/yr
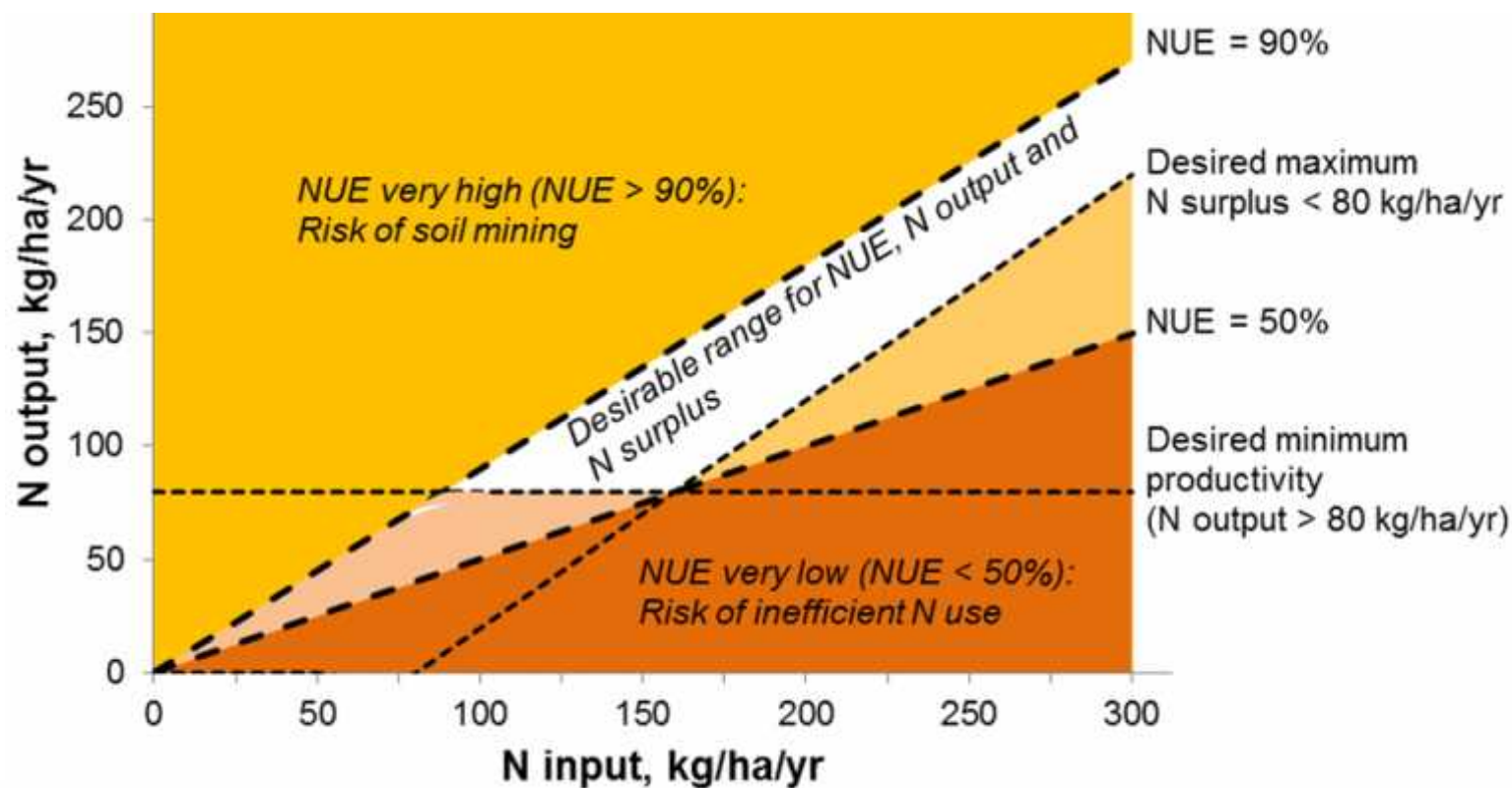
Broadbalk. Mean long-term winter wheat yields 1843-2015
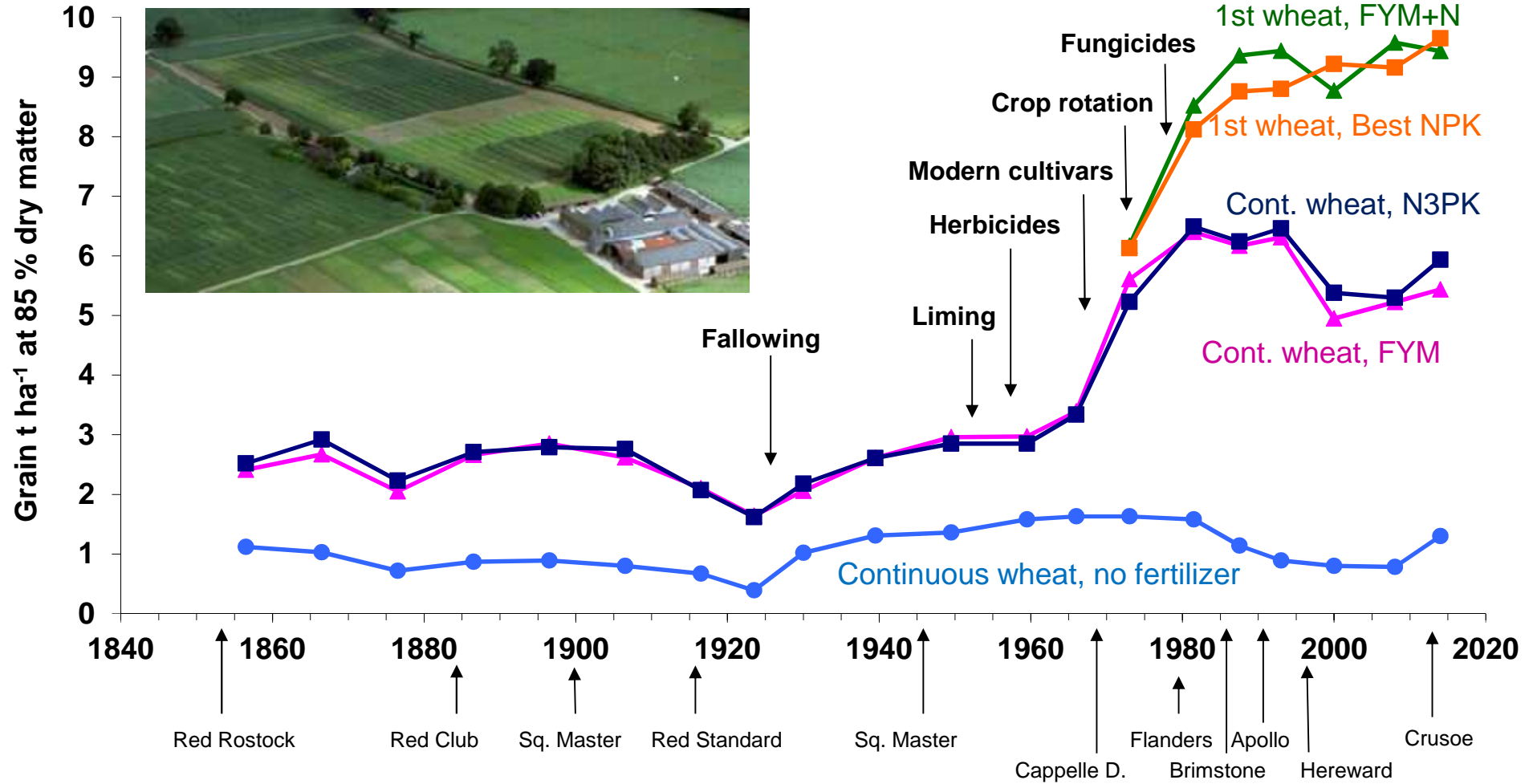
NUE of wheat in two cropping systems at Broadbalk
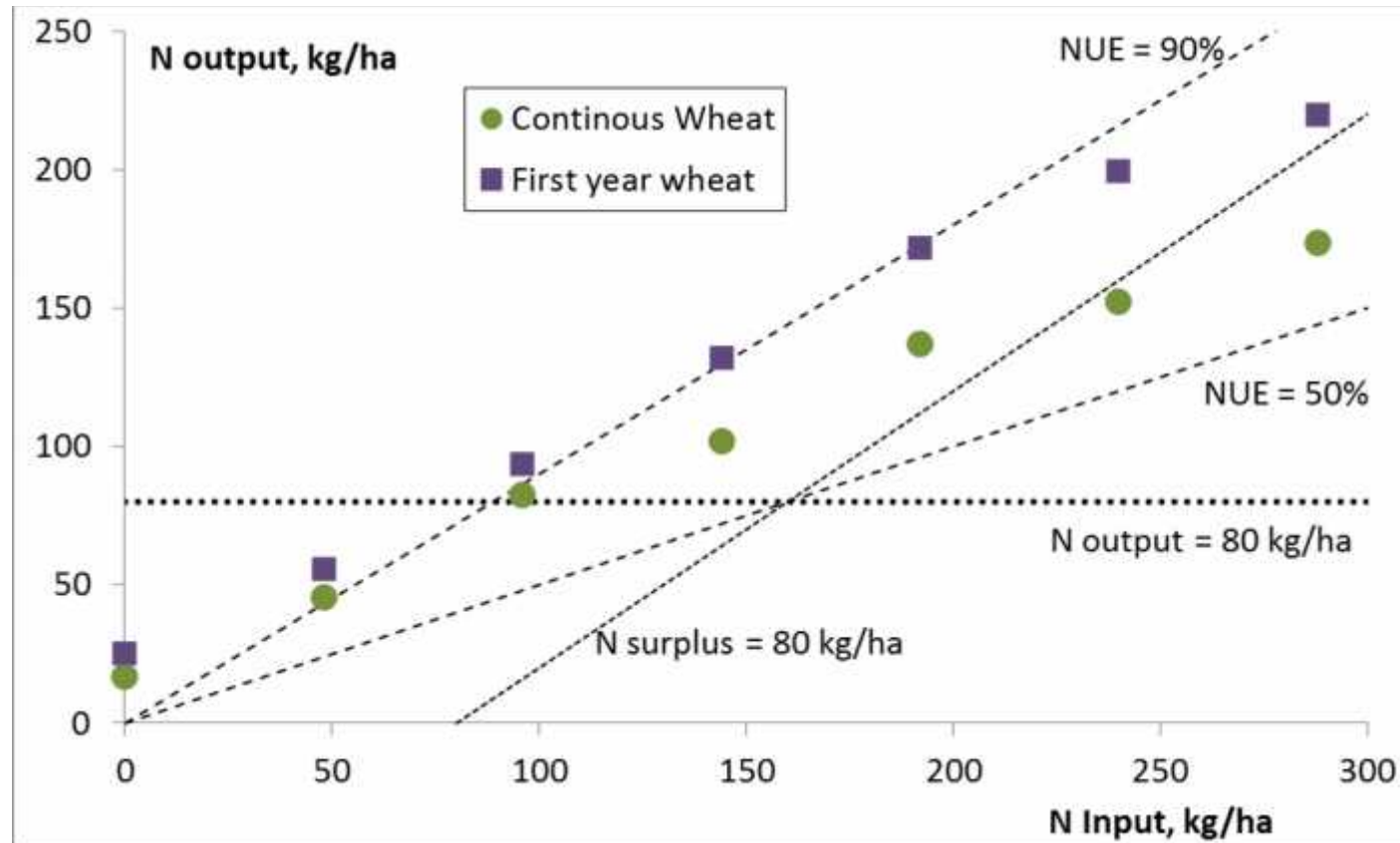
Broadbalk wheat experiment, Rothamsted, mean results 1996-2012
Macdonald et al (unpublished); RA http://www.rothamsted.ac.uk/era

BertelsmannStiftung

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- Report card, complementary to the official SDG Indicators
- Countries can get started on the SDGs with existing data
- Understandable for government officials, business, civil society, funders, citizenry
- First version: 77 indicators (14 only for OECD), 149 countries
- All scored 0-100; ranking
- Traffic lights

http://www.sdgindex.org/

SDG **INDEX**
& DASHBOARDS

A GLOBAL REPORT

JULY 2016

| BertelsmannStiftung
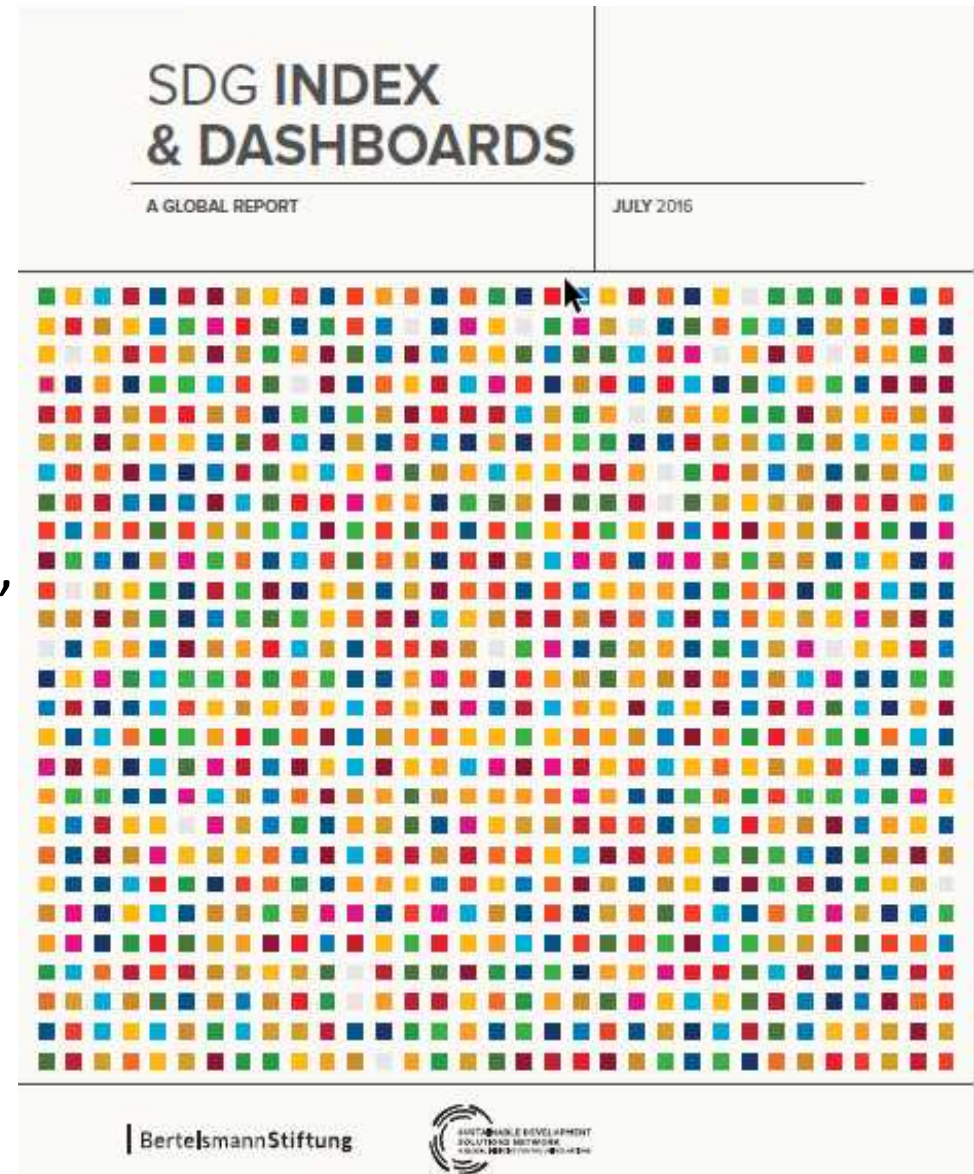
Augmented SDG Dashboard for OECD countries

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Australia																	
Austria																	
Belgium																	
Canada																	
Chile																	
Czech Republic																	
Denmark																	
Estonia																	
Finland																	
France																	
Germany																	
Greece																	
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Israel																	
Italy																	
Japan																	
Korea, Rep.																	
Luxembourg																	
Mexico																	
Netherlands																	
New Zealand																	
Norway																	
Poland																	
Portugal																	
Slovak Republic																	
Slovenia																	
Spain																	
Sweden																	
Switzerland																	
Turkey																	
United Kingdom																	
United States																	

SDG Index and Dashboard

World's Progress on the Sustainable Development Goals

Index Rank	Country	Overall Index Score (0-100)
1	Sweden	84.5
2	Denmark	83.9
3	Norway	82.3
4	Finland	81.0
5	Switzerland	80.9
6	Germany	80.5
7	Austria	79.1
8	Netherlands	78.9
9	Iceland	78.4
10	United Kingdom	78.1
11	France	77.9
12	Belgium	77.4
13	Canada	76.8
14	Ireland	76.7
15	Czech Republic	76.7
16	Luxembourg	76.7
17	Slovenia	76.6
18	Japan	75.0
19	Singapore	74.6

http://www.sdgindex.org/
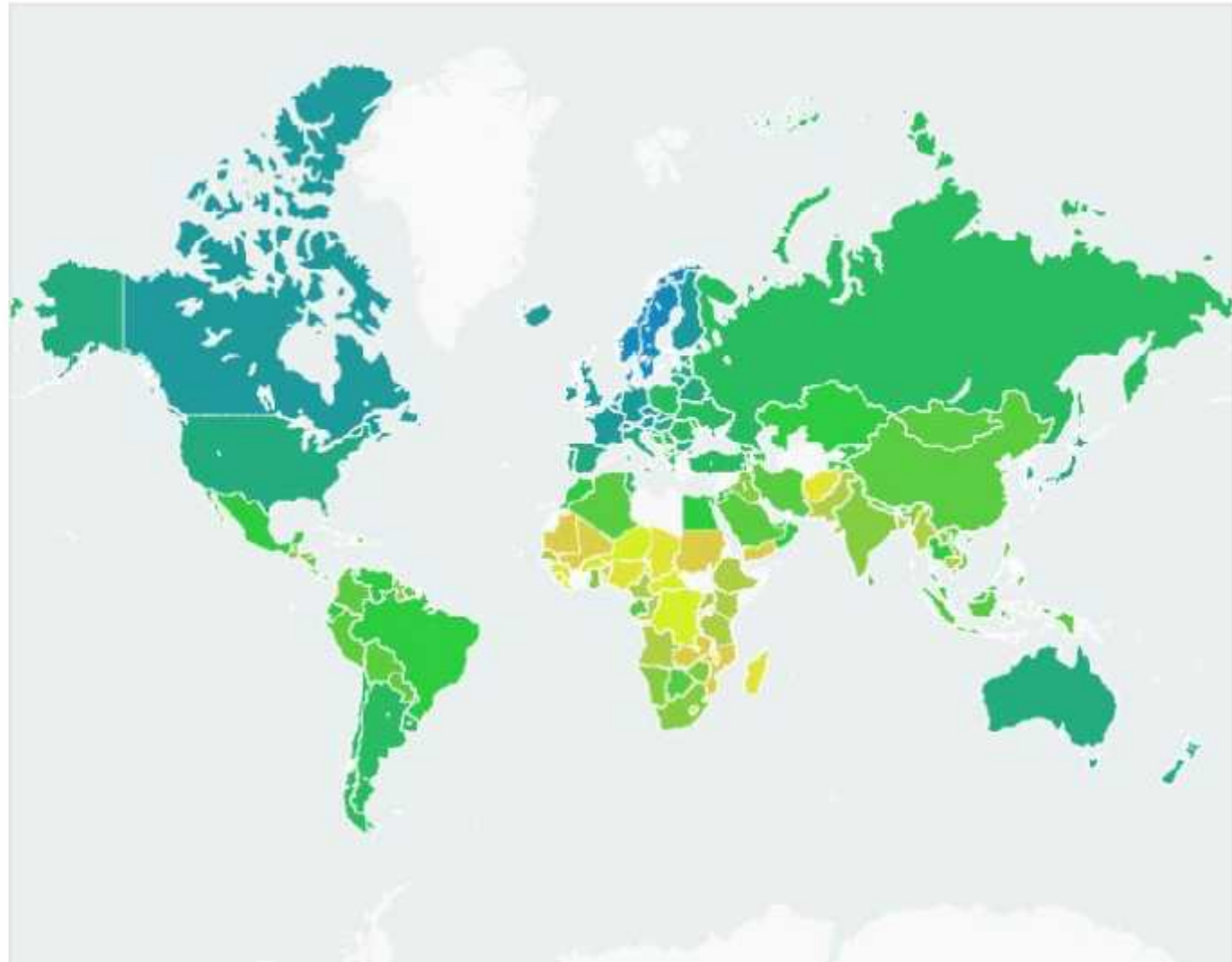
# Indicator for SDG 2: Sustainable Nitrogen Management Index (0-1)
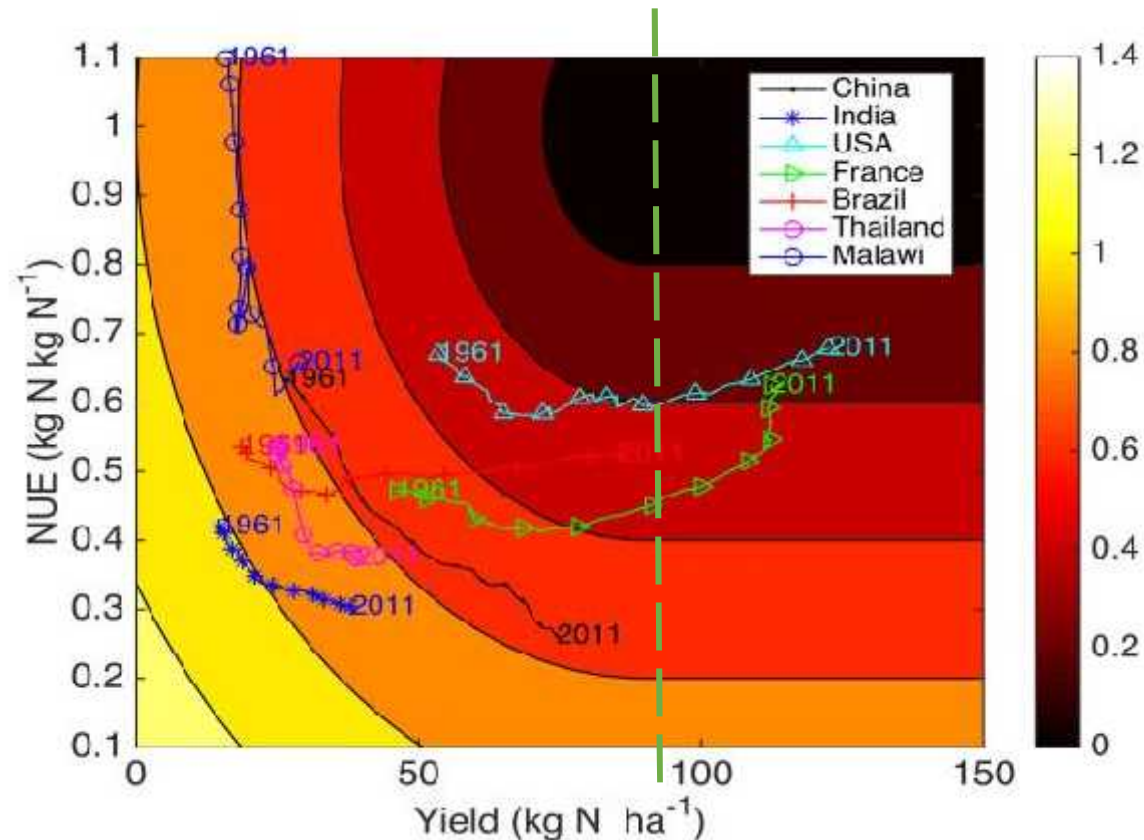
N index ranking score based on NUE and N yield. The color bar shows the ranking score using a .   of 90 kg N ha^{-1} yr^{-1} (required avg. global N yield to meet 2050 crop production targets to avoid cropland expansion). Low values (dark shading) in the upper right are the best scores (highest ranking).
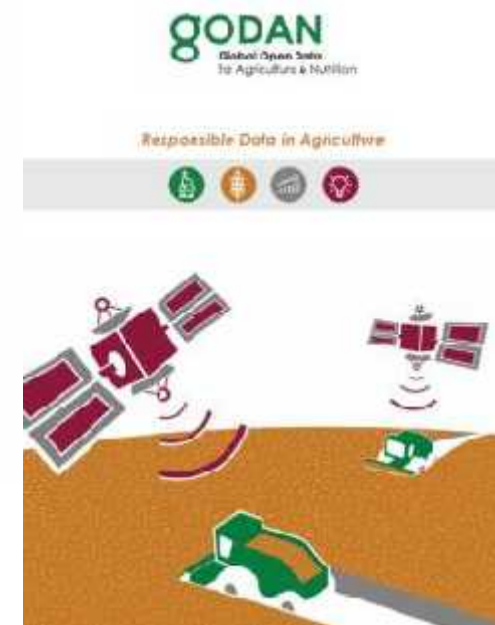
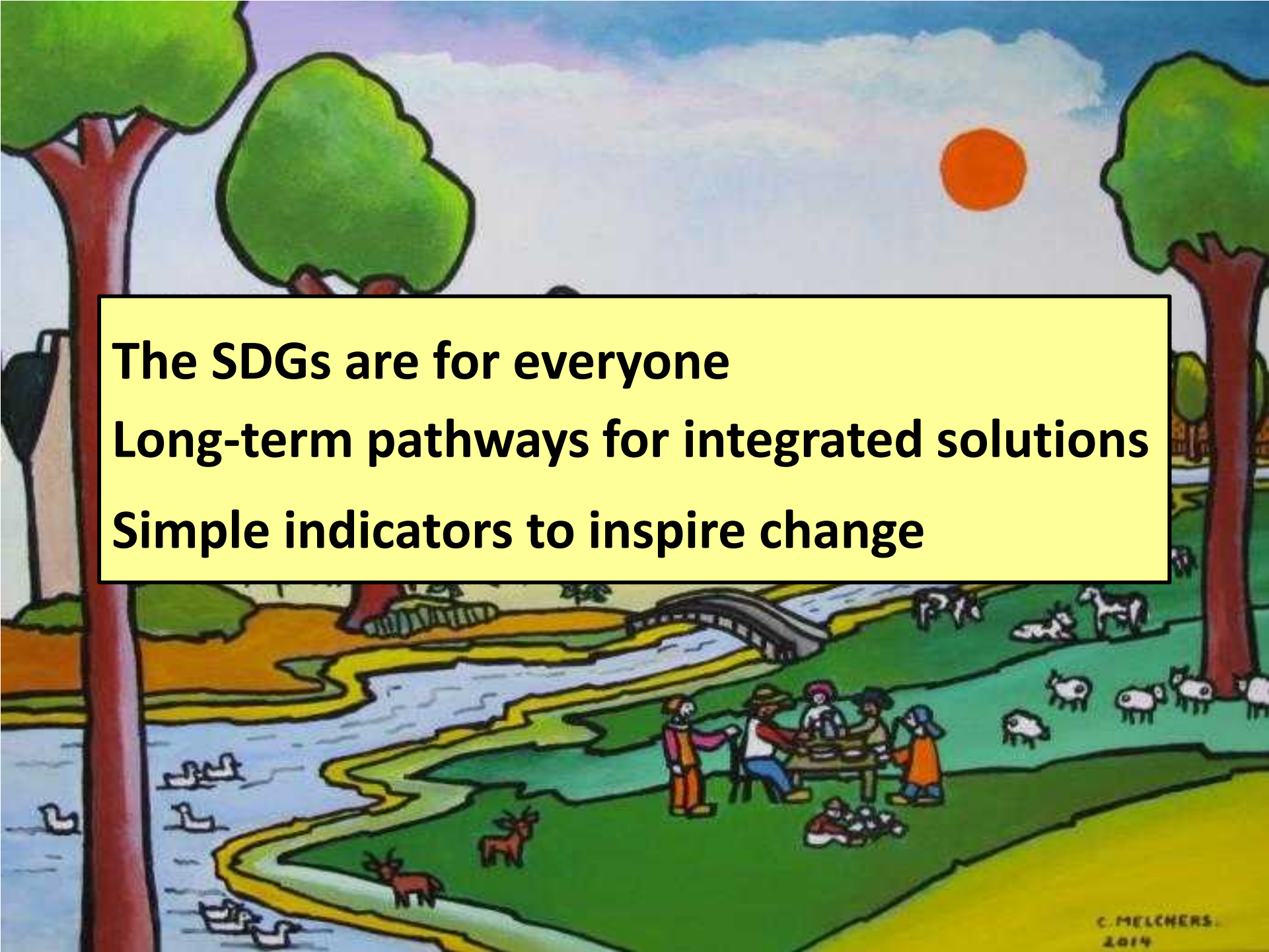X Zhang, EA Davidson, Sustainable Nitrogen Management Index, working paper
http://www.umces.edu/sites/default/files/profiles/files/Ranking%20Method_submit_to_SDS N_SNMI_20160705_0.pdf

Nutrients data revolution?

http://www.godan.info/
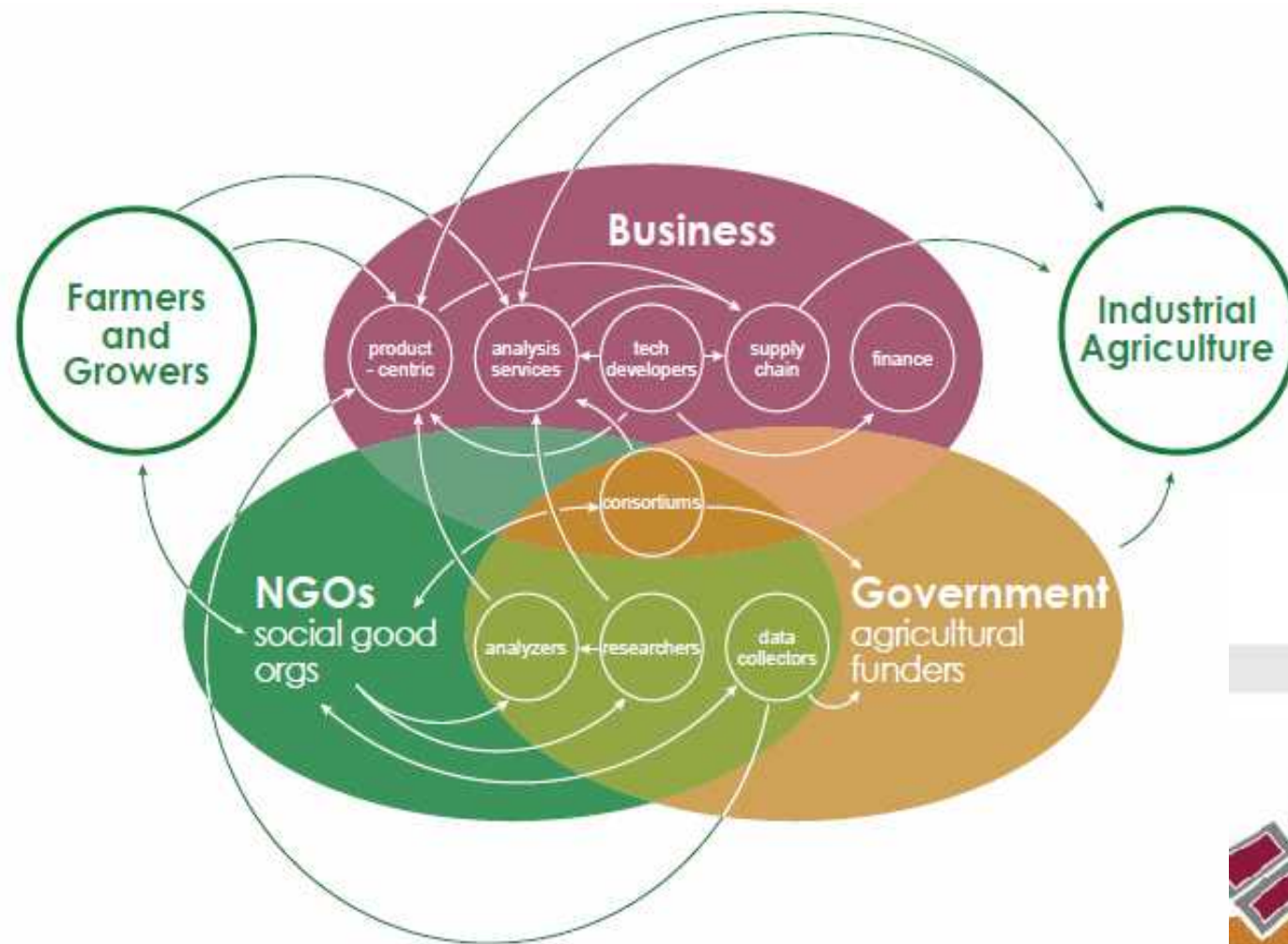
The SDGs are for everyone

Long-term pathways for integrated solutions

Simple indicators to inspire change