IEA Technology Collaboration Programme
on Energy Efficient End-Use Equipment

IEA 4E Smart Sustainability in Lighting and Controls (SSLC) Platform

A New Term Focused on Smart Lighting Systems, 2024 to 2029

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iea-4e.org

We love regulation

We love innovation & technical development

We love international standards

(And, we love acronyms too…)

But how can we speed up the processes?

How can we get outcomes that better reflect the policy objectives of governments?

What's Behind Those Hopeless Acronyms?

- International Energy Agency Technology Collaboration programmes (TCP)
- IEA 4E – Energy Efficient End-use Equipment
- SSL Annex… Solid State Lighting Annex
- → Now SSLC Platform or Smart Sustainability in Lighting and Controls
- **This is a very good set up for serving the needs of governments with high ambitions to make effective policies**
- **Let's look into the next 5 years' focus areas**

The IEA TCP Structure – High Degree of Independence

- IEA – International Energy Agency – is an independent intergovernmental body (linked to OECD)
- TCPs are ”affiliated groups”, i.e., also independent
- We work within a legal structure and framework governed by the IEA
- Delegation downwards of responsibilities and financial commitments
- The TCP ExCo reviews but delegates responsibility to the Platforms under each TCP
- Thus “Platforms” have much independence from the TCP.

Moving Into Our 4th Term As the SSLC Platform

- The Solid State Lighting Annex –> Now Smart Sustainability in Lighting and Controls
- Five-year workplan, going into its 4th term
- Since 2010
- Australia, Denmark, France, Sweden, South Korea, UK, and from 2024 also the European Commission
- MC formed by government representatives
- A group of experts nominated and funded (in-kind) by member countries

BY and FOR governments:

We are created *by* governments and work *for* governments to serve the *needs* of public interest

Strong together – pooling resources!

Reducing CO_2 Requires A *Broad* Set of Policies – EU example

EU Emissions Trading System (ETS)

- A strengthened cap on overall emissions under the EU ETS
- Aim to expand the use of emission trading to the maritime, buildings and road transport sectors
- Look into the integration of all emissions from fossil fuel combustion

Energy Efficiency

- Review the current EU energy efficiency target of 32.5% by 2030
- Launch a renovation wave to improve housing quality in the EU
- Strengthen the role of Eco-design standards to ensure EU consumers have access to efficient products

Renewable Energy

- Review the current target of 32% of renewables in the EU energy mix by 2030
- Review and revisit the biomass sustainability criteria
- New European terminology and certification system for all renewable and low-carbon fuels

Road transport CO_2 emissions

- Revisit and strengthen the CO_2 standards for cars and vans for 2030 and beyond
- Reflection on phase-out target date

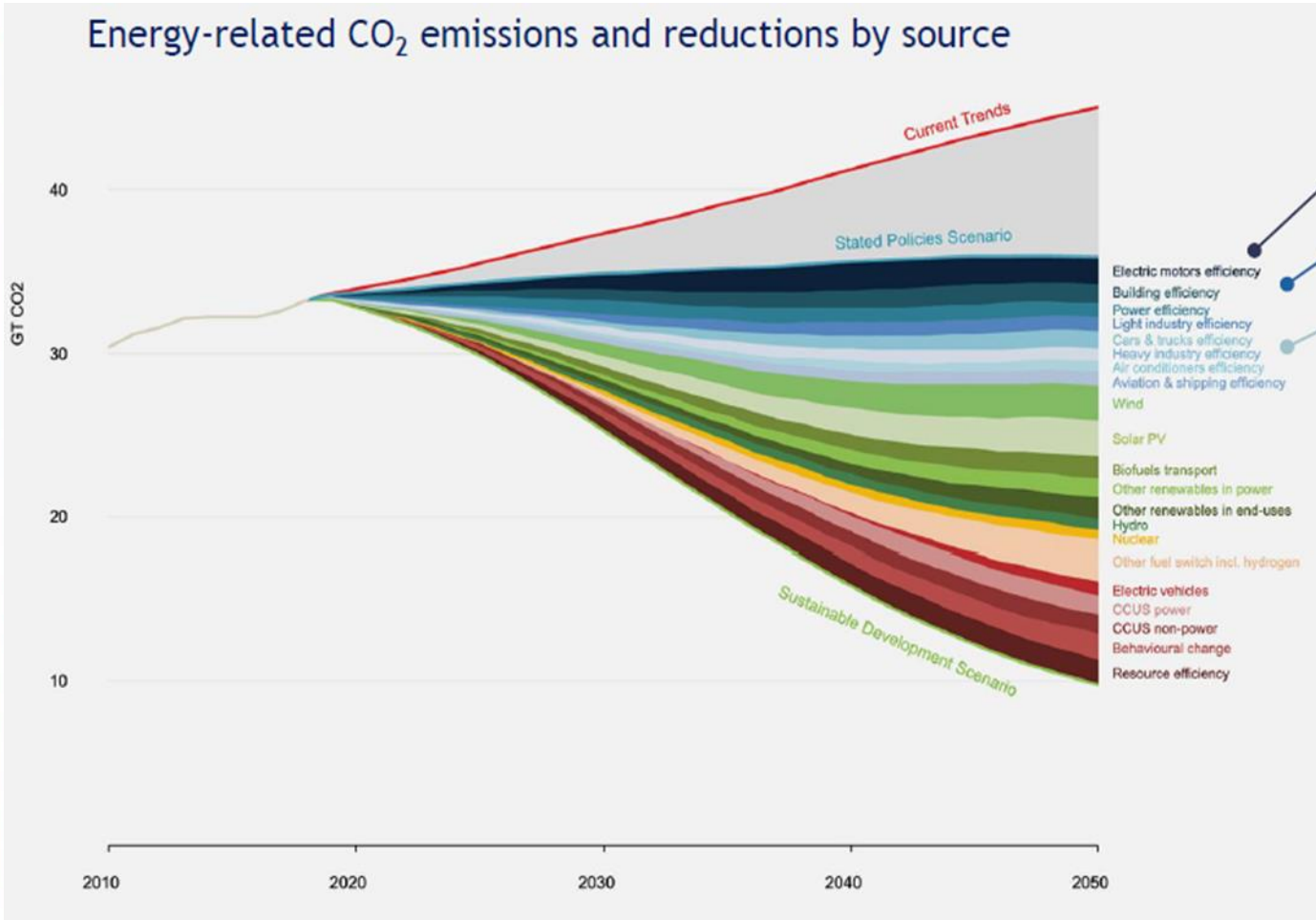
Agriculture, Land Use, Land Use Change and Forestry (LULUCF)

- Integrated approach to reduce emissions from agriculture, provide bio-based materials for our

Effort Sharing

- Options range from reduced scope to potential future repeal if all emissions are covered by other policy instruments, while

Four Product Groups Are a Third of Global Electricity Use



Electric motors efficiency

Building efficiency, incl. lighting and refrigeration

Air conditioners efficiency

Industrial electric motors, along with residential lighting, cooling and refrigeration are responsible for more than **a third of current global electricity consumption.**

UNEP Emissions Gap Report (2017) notes that efficient appliances is one of the six areas with **highest potential of closing emissions gap to Paris.**

Therefore, improving energy efficiency for these products is a key source of emissions reductions to achieve the Paris targets.

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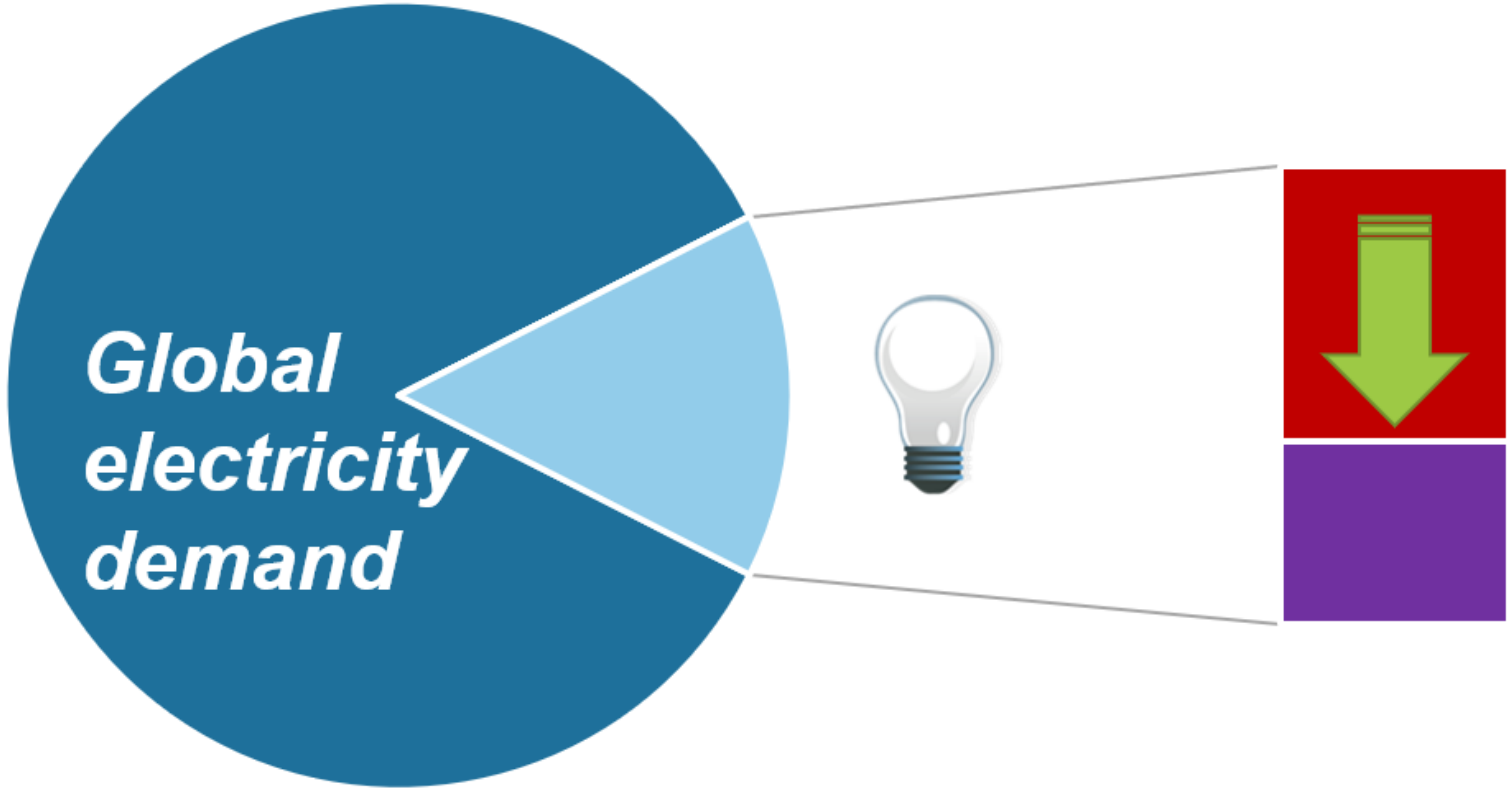
Continuing a Broad Focus on SSL Technology in a Context

- SSL Annex launched in 2010; conducted three 5-year terms focusing on a range of topics:
  - Health impacts
  - Environmental impacts
  - Metrology challenges,
  - laboratory calibration (three major global interlaboratory comparisons)
  - Quality and performance recommendations
  - Standards assessment, helping governments to apply standards (but we are not a standards organisation).
  - Provided advice to our member countries

Global SSL Award for Outstanding Achievement by the ISA (2023)

Ms. Ling Wu, President of China Advanced Semiconductor Industry Innovation Alliance and Member of ISA Council of Management, and Dr. Yoshi Ohno, NIST Fellow, Sensor Science Division and SSL Annex Expert.

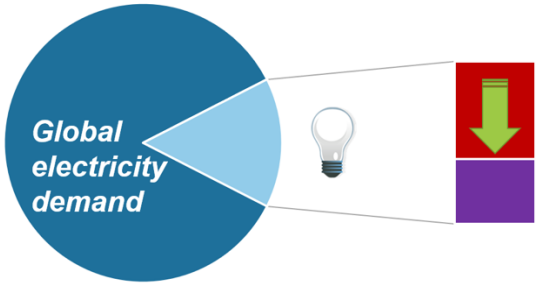
IEA 4E Lighting Work Continues, 2024-29



- Lighting ~12% of global electricity consumption
- Significant cost-effective opportunity for *further* savings

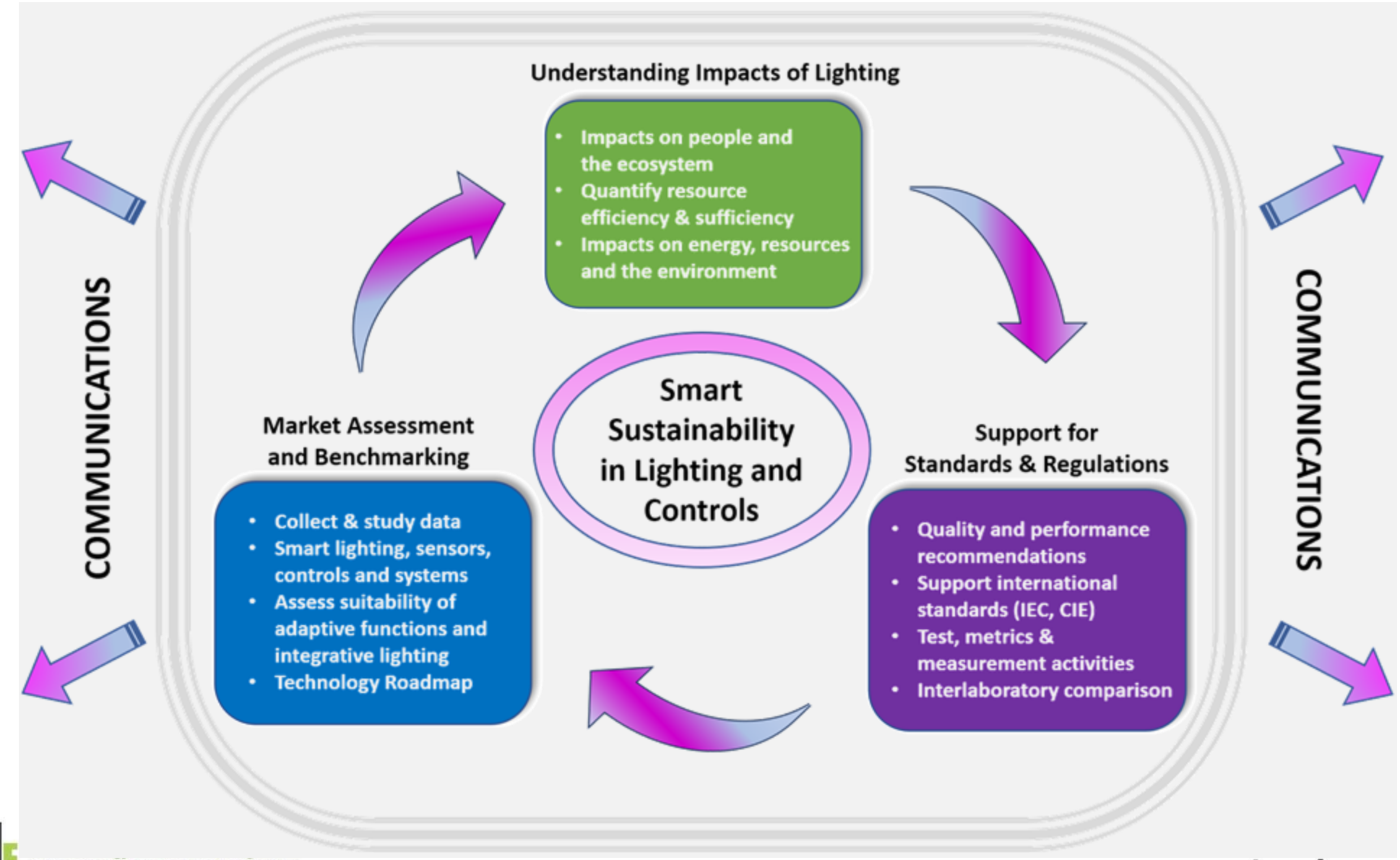
A Stronger Focus on Controls & Systems, and Resource Efficiency

- Making controls in lighting systems more sustainable, appropriate and adaptive to end-users



- Systems issues: Define systems, understand interaction with other technologies. How to measure, compare and evaluate?
- Considering material and resource efficiency, circular economy
- Combine policy and technical expertise from lighting member countries across different horizons and disciplines
- Collaborate with other IEA TCP Platforms and initiatives

IEA 4E SSLC Platform: Focusing on 3 Connected Areas of Research



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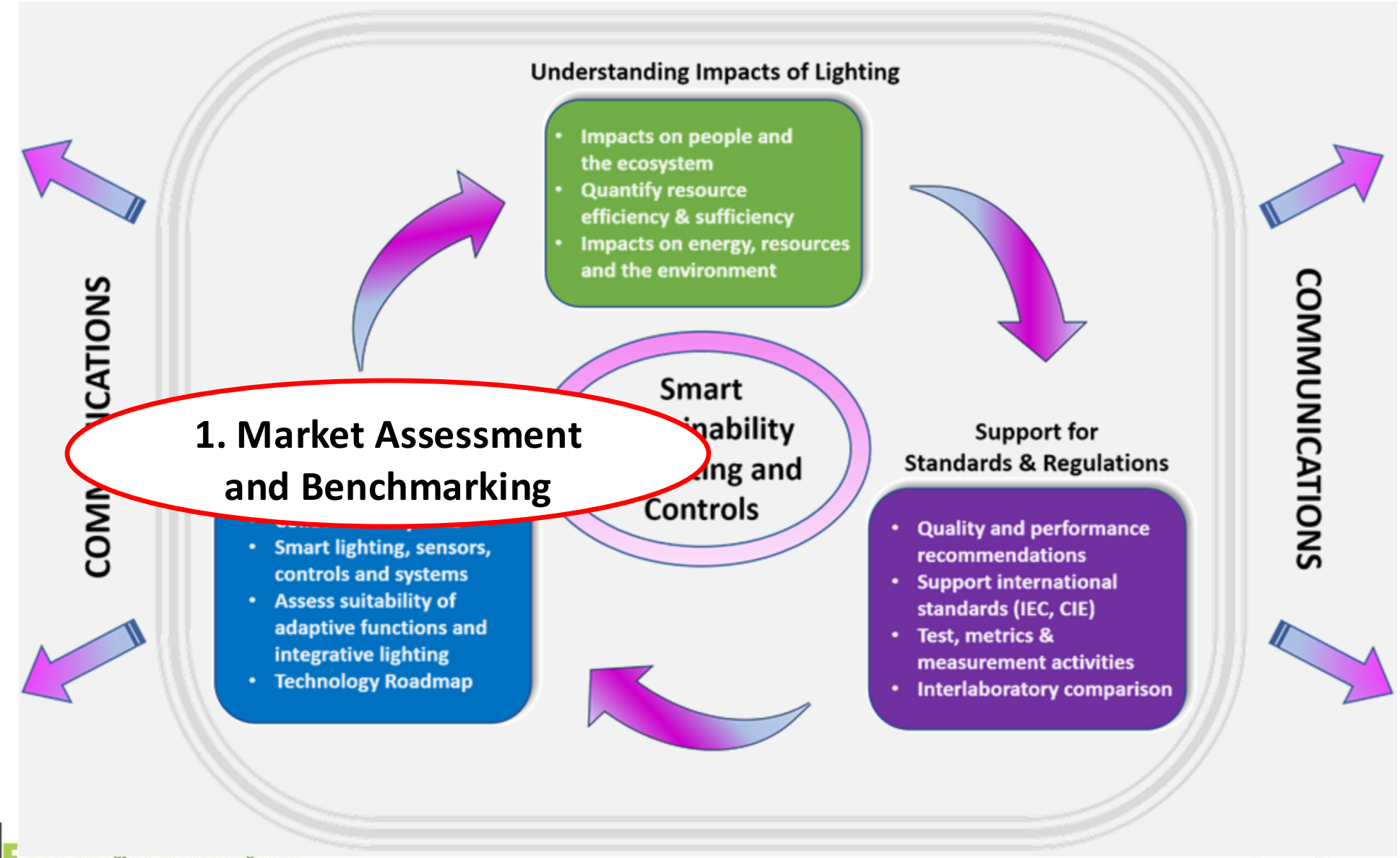

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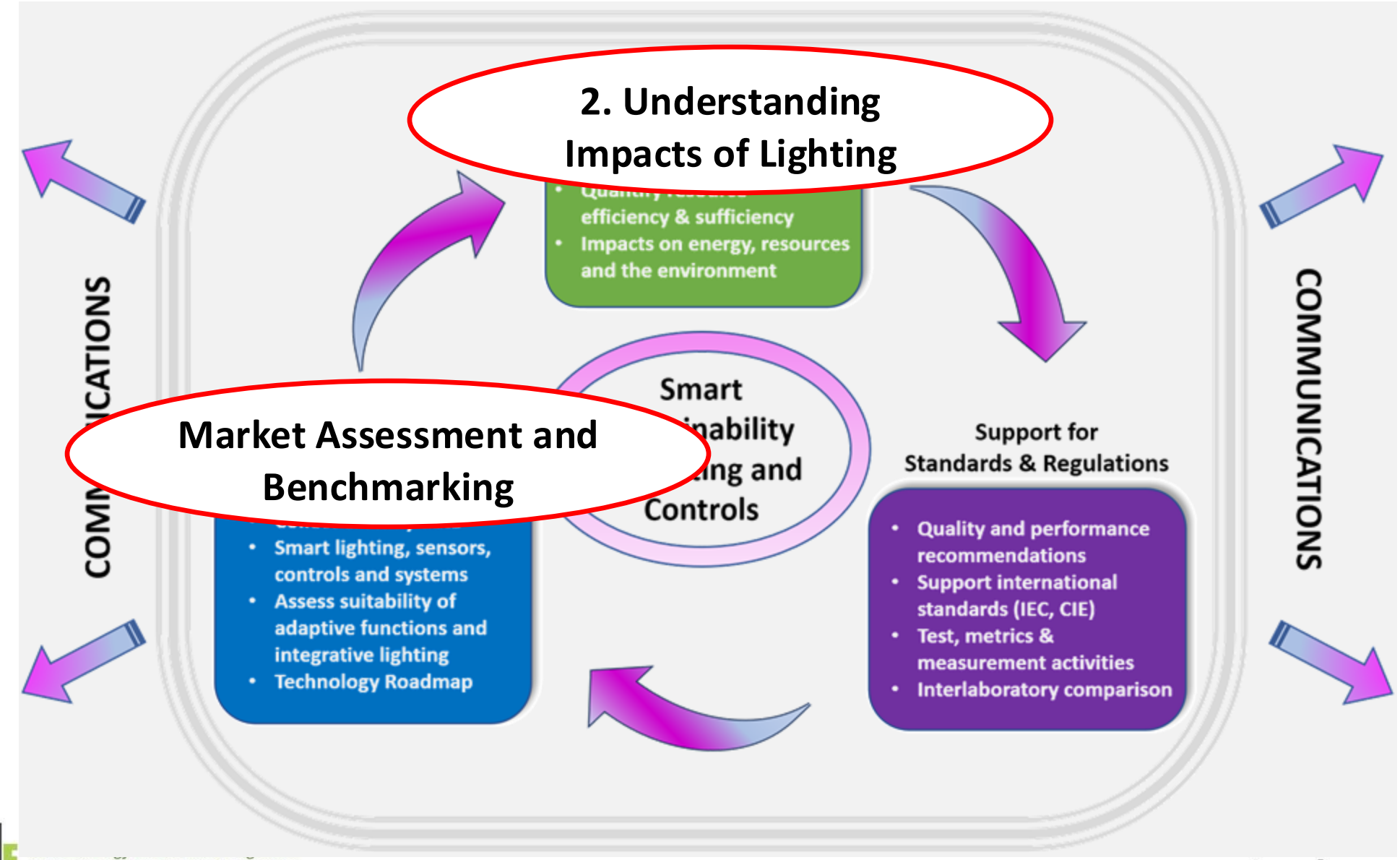

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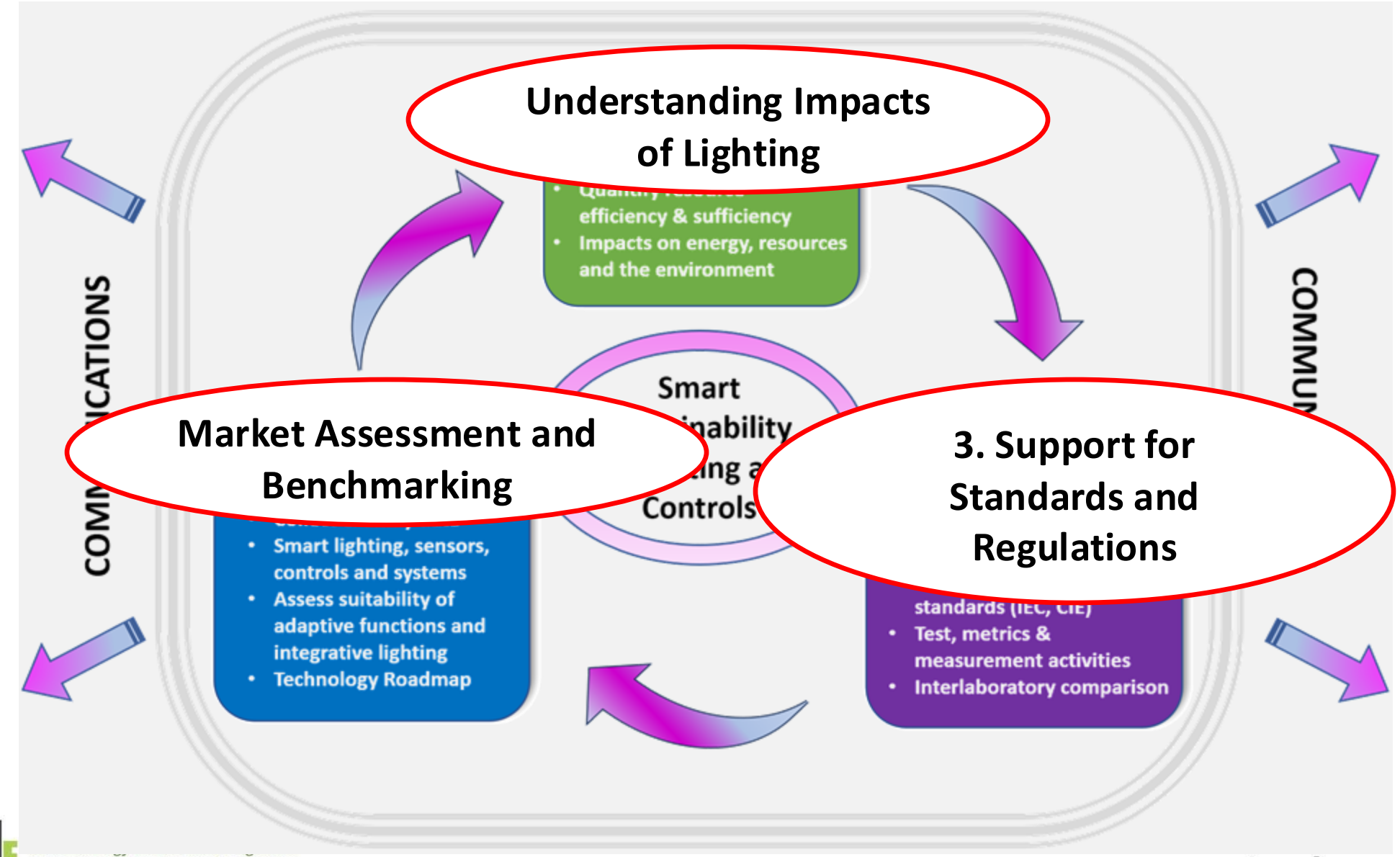
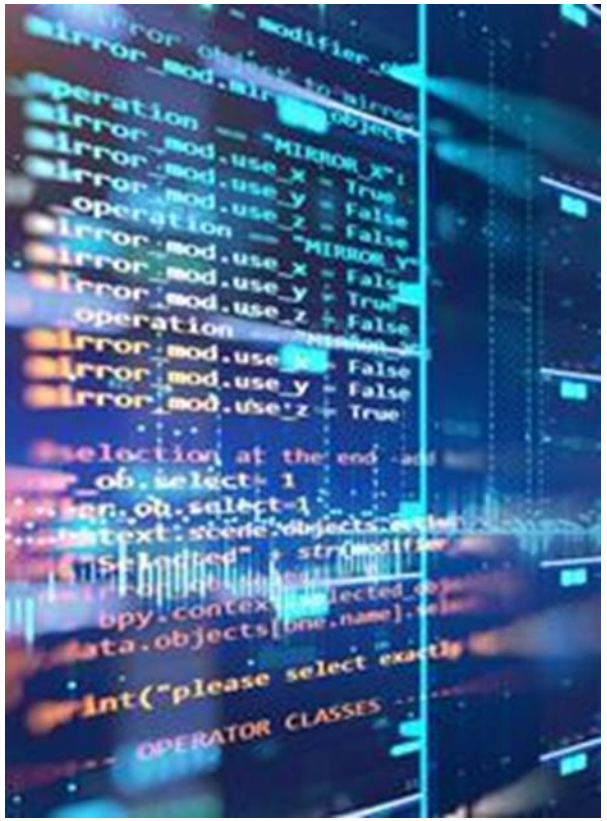


Task 1. Lighting Product Database and Lighting Systems Performance Tracker (not public)



- Available to member governments only (internal data)
- Contains *test data and product registry databases* from around the world
- *Over 7 years of data,* reference source for benchmarking and trend forecasting (planning public reports!)
- Improved information symmetry between governments and industry
- Offers *guidance on technology trends* in smart lighting systems
- expand into a *lighting system* energy performance database

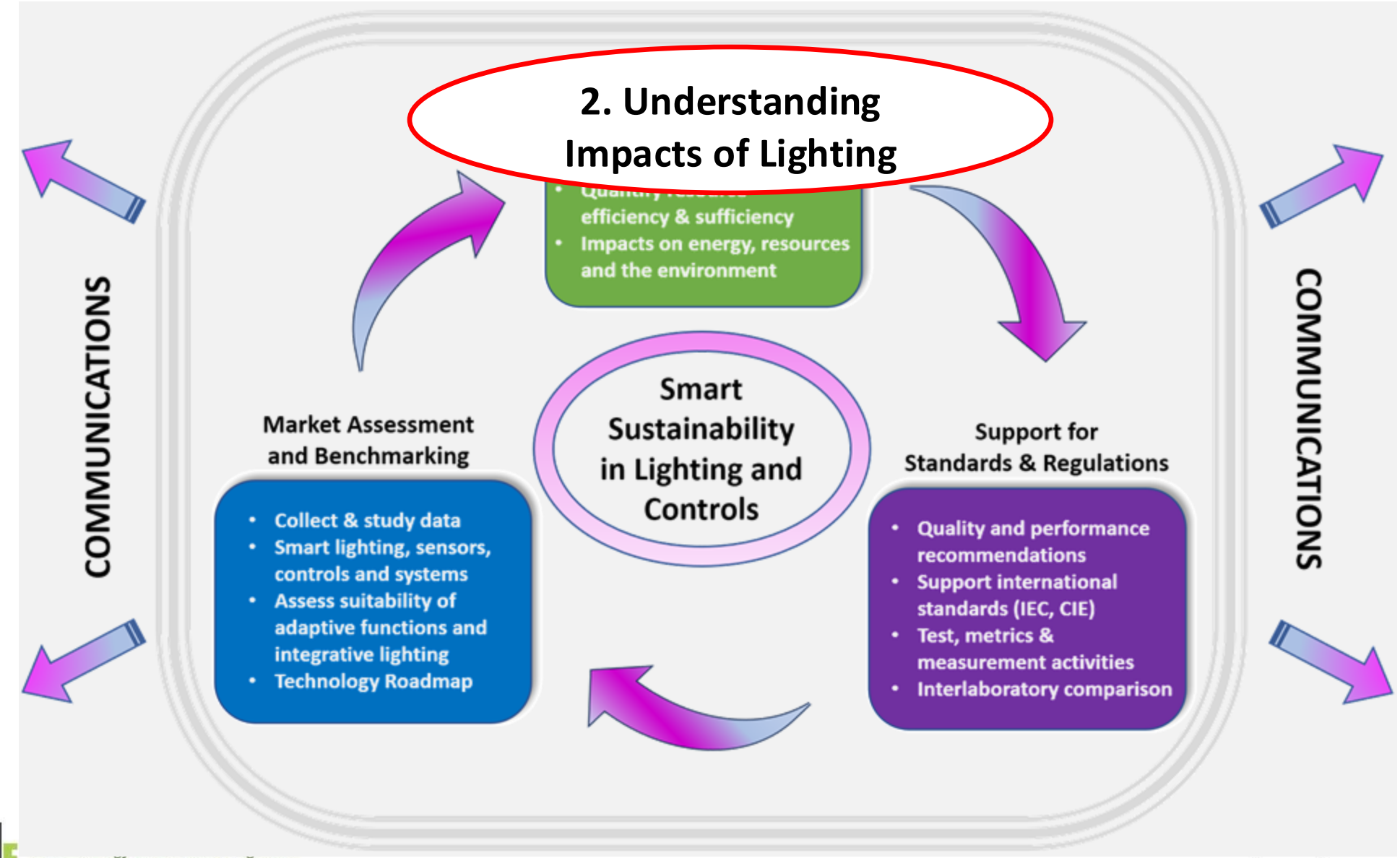
Task 2. Smart Lighting: Testing, Controls and Systems

- *Connected devices* >15 billion (2023) with 16% growth
- Lighting critical part of this global trend
- Study *energy consumption and smart features in lamps*, luminaires and lighting systems
- Investigate a new classification system
- Look at *test methods* – identify gaps and improvements to better reflect smart systems
- *New topic areas:* case studies and data, energy-efficiency, light based local communication (LiFi), plug-in systems
- *Develop policy guidance* for member governments on smart lighting systems and features

Task 3. Technology Roadmap Development

- Develop a Technology Roadmap on SSL (products & Systems),
- Work jointly with experts from Industry (e.g., ISA, CIE and IEEE Smart Lighting and Smart Cities)
- Identify the human, environmental, materials, technical and market-based aspects for growth
- Look at system integration and environmental impacts
- Consider health, light sources, optics, communications protocols, sensors and the system/controls regimen
- Support global agenda for SSL to reach its full market potential

IEA 4E SSLC Platform: Focusing on 3 Connected Areas of Research



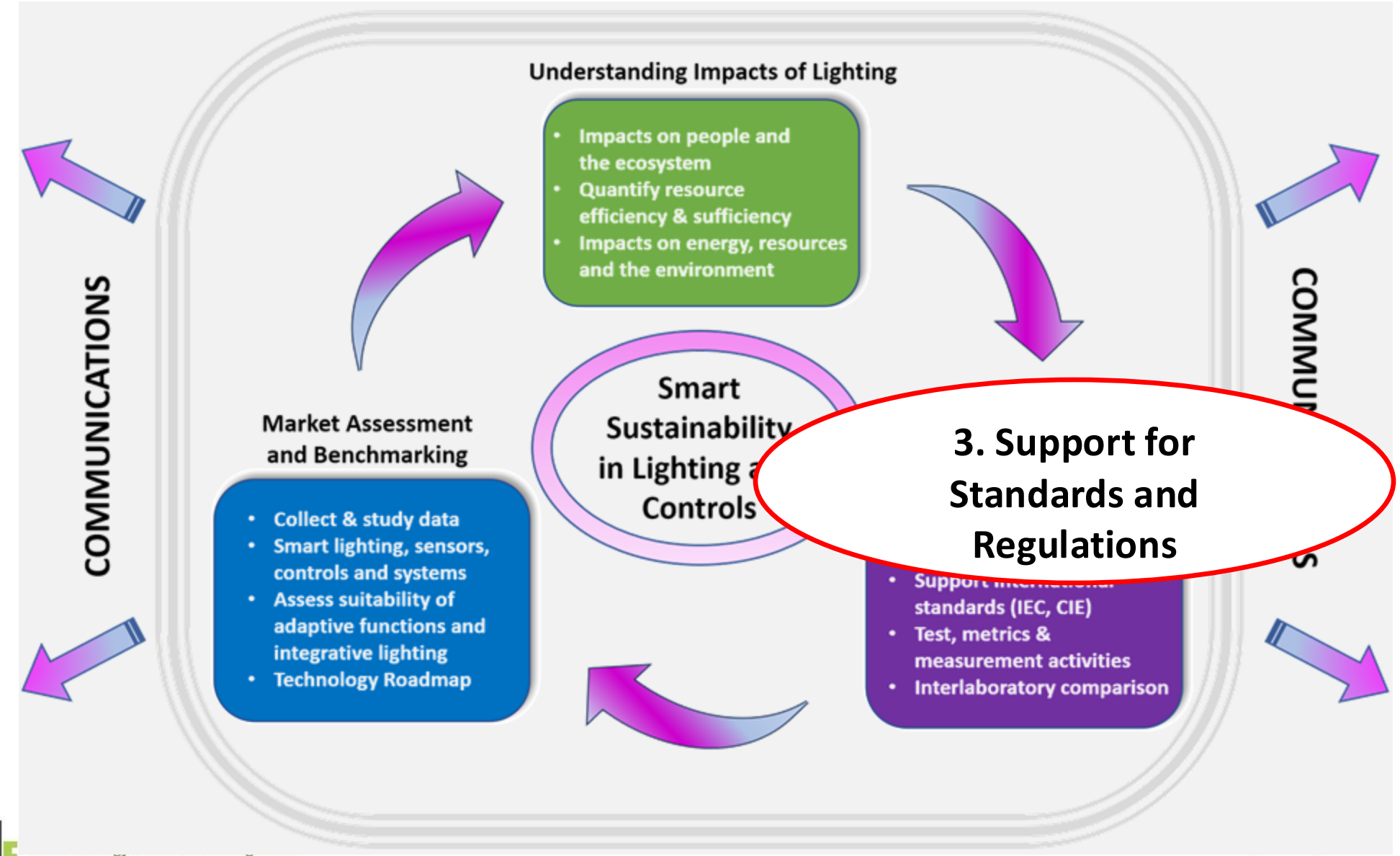
Task 4. Lighting and Health Impacts

- Focus on human-related aspects of SSL
- Consider the impact of LED lighting on human performance (e.g., light & productivity in office/school) as well as hospital recovery rates
- Conduct a critical review of literature (meta-study)
- Identify ways to reduce adverse health effects of lighting
- Develop guidelines for governments to address health-related issues of SSL
- (New report just released – see web site!) https://tinyurl.com/3f9v2mxf

Task 5. Energy, Material and Environmental Impacts

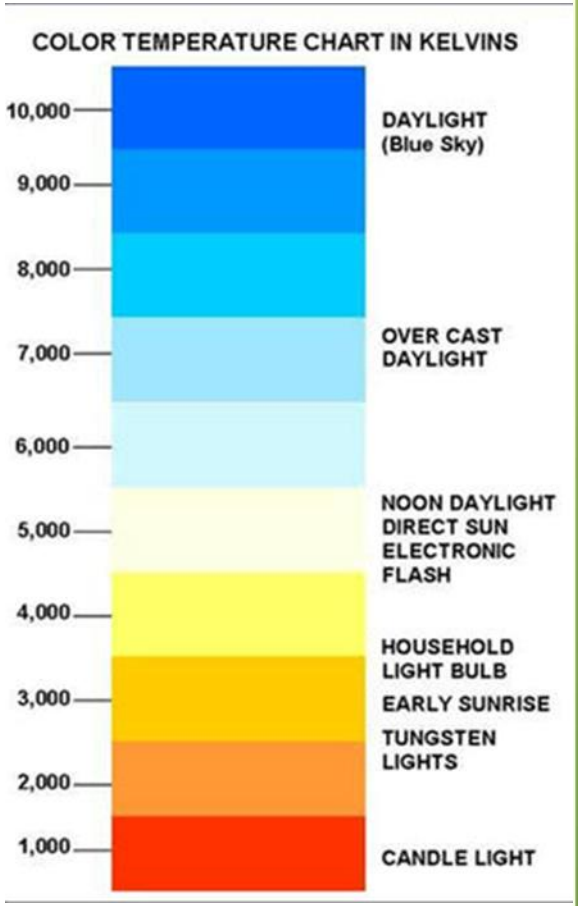
- Two main components of this Task:
  (1) impact of light pollution on the environment;
  (2) impact of lighting products and systems from a resource efficiency perspective (LCA)
- Light pollution – consider obtrusive light, sky glow and impacts on flora and fauna
- Material and resource efficiency – considering all lighting, look at repairability / serviceability; life-cycle energy impacts, and savings from lighting systems
- Consider both indoor and outdoor lighting systems

IEA 4E SSLC Platform: Focusing on 3 Connected Areas of Research



Task 6. Recommended Quality and Performance Requirements (set of model recommendations)

- 10+ years of work on harmonised quality and performance requirements
- Relying on product data and consultations (e.g., database)
- Combine product categories where appropriate, extend to new product categories if needed
- Update test methods used and product descriptions, consider new metrics or criteria (e.g., dimmability or colour-tuning)
- Consider potential for lighting system requirements,
- Publish recommendations and promote adoption



Task 7. Interlaboratory Comparison for Lighting Systems and Controls

- Building on our legacy of IC 2013, IC 2017 & IC 2023 (general, directional and TLM)
- Design an Interlaboratory Comparison using lighting systems/controls
- Existing test quantities & conditions for assessing performance of lighting systems/controls?
- Select/design artefacts and develop Technical Protocol + test proof of concept.-
- Share findings with the standardisation community

Area 3: Support for Standards and Regulations

Task 8. Support for International Standards, Metrics and Measurements

- IEC TC 34 reviews over next five years, including direct input on:
  - IEC test methods for Temporal Lighting Modulation, or “flicker”
  - finalising the performance standard for LED light sources, IEC 63221
  - next review of photobiological safety of lamps and lamp systems
- IEC 63103, Lighting Equipment - Non-active mode power measurement
- IEEE 3001.9, Recommended Practice for the Design of Power Systems Supplying Lighting Systems in Commercial and Industrial Facilities.
- IEEE Smart Lighting Initiative strategy development and roadmap (Special focus!)

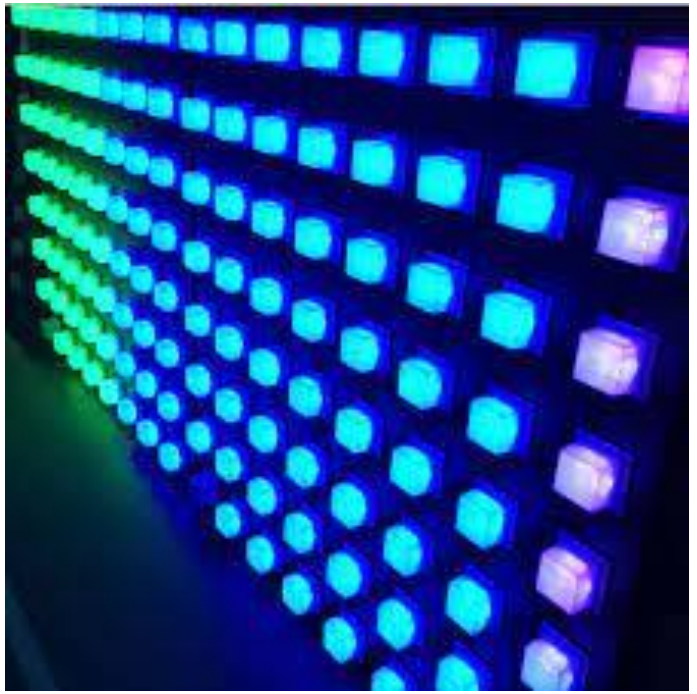
Area 3: Support for Standards and Regulations

Task 8 (cont'd). Support for International Standards, Metrics Measurements

- (Agreement between SSL Annex and CIE) and its revision IC 2017
- CIE S 025 - Test Method for LED Lamps, LED Luminaires and LED Modules (also EN 13032-4) (IC 2013 input)
- CIE TC 2-89 development of measurement methodology for Temporal Light Modulation (TLM – "flicker") (IC 2023 input)
- Input to CIE Division 1, Vision and Colour, concerning updates to colour quantities
- Input to CIE Division 6, Photobiology and Photochemistry, currently updating health impact standards of lighting

Communications and Logistics

- Raise awareness about our work broadly to a range of audiences:
  - governments,
  - policymakers,
  - regulators,
  - standardisation bodies,
  - test labs,
  - lighting associations,
  - businesses and more



- Expert meetings every 6 months
- Inviting new countries / economies to join at this point – start of the Fourth Term (2024-2029)

Thank you for your time and attention. Any questions?

Prof. Georges Zissis

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