



**Part 1:
Review of Terminology effort currently
underway within ISO/TC 229**

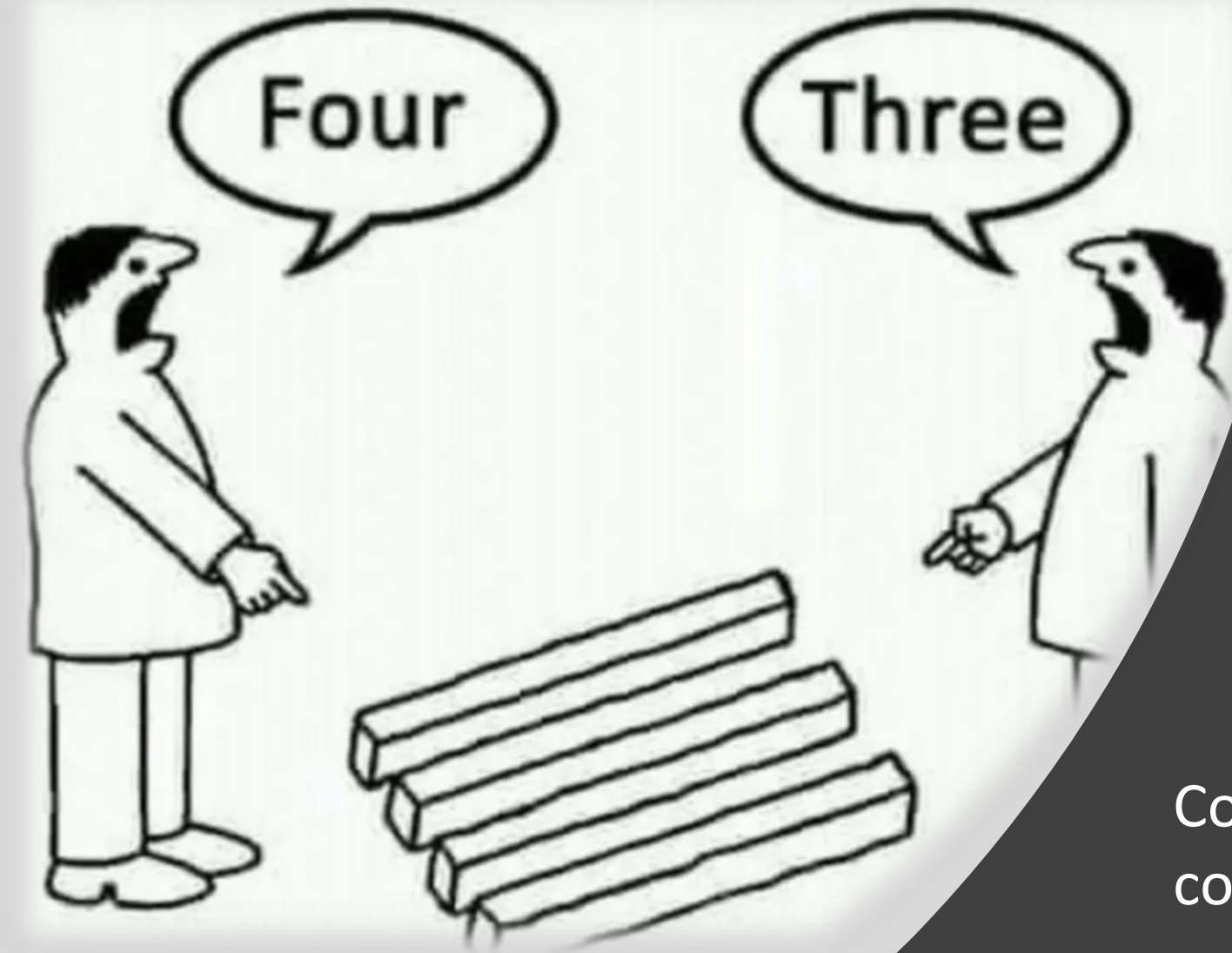


**Standards
Development for
Advanced
Materials –
Relevant Actions**

**ANSI Nanotechnology Standards Panel
Advanced Materials Virtual Workshop
May 4, 2022**

Scott C. Brown

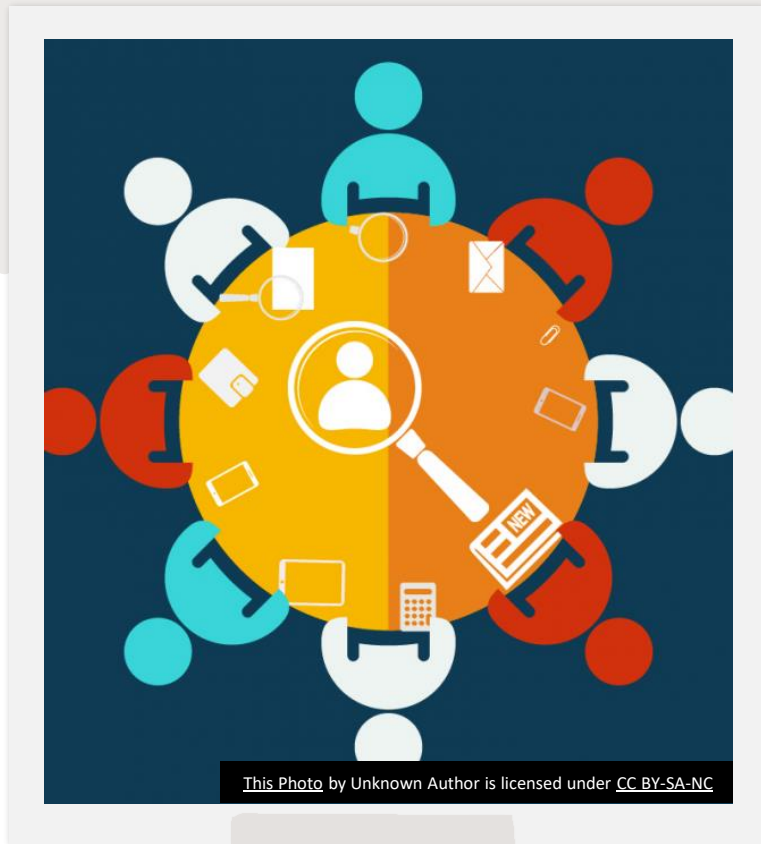
Why Terminology?



Perspective can differ.

Consistency and clarity in communication is essential!

Advanced & Emerging Materials Study Group (SG)



- Formed in Spring of 2020
- ANSI Led in ISO TC 229 Nanotechnologies
- 40+ ISO participants, 6+ countries
- Internals & external engagement surveys, consultation.

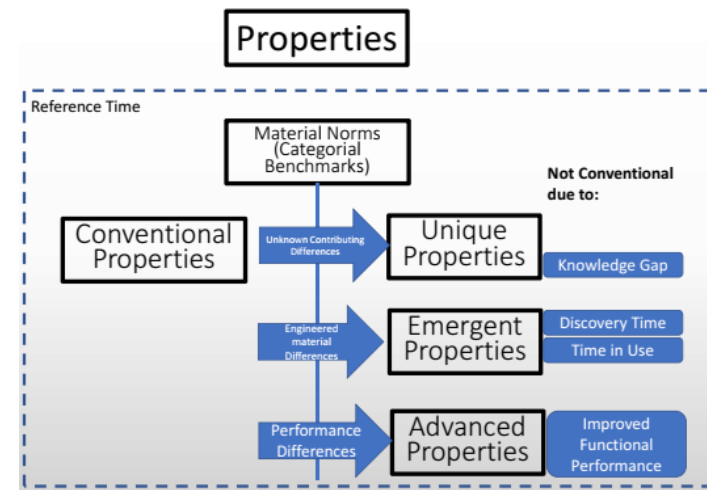
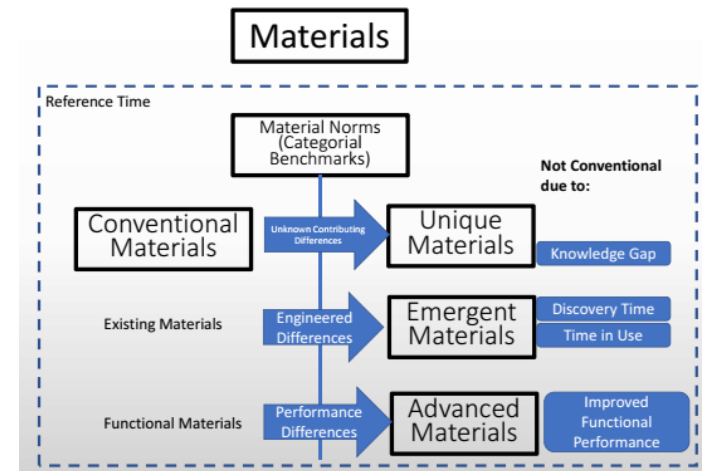
Terms of Reference – Advanced and Emerging Materials Study Group

1. **Evaluate the need for terminology** surrounding advanced and emerging materials dealing with nanotechnology.
2. Evaluate the need for additional terms to **clarify differences between variations in the use of terms** related to advanced materials.
3. **Discuss** with other TC/229 working groups to identify **needs** in terminology and **liaise** with other relevant organizations as needed.

Advanced Materials Study Group

First Meeting (Sept. 2020)

- Reviewed several existing definitions
- Reviewed a framework including advanced, emerging and unique materials.
- First survey generated.

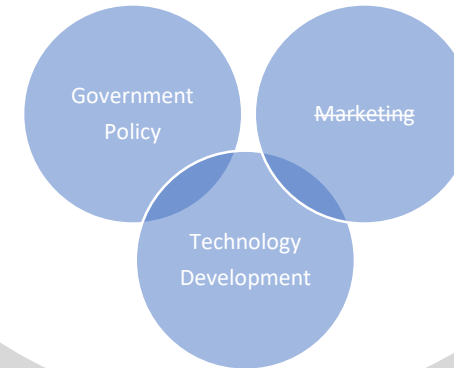


Review of Prior Activities

Meetings held between Nov 2020 - 2022

- 5 surveys
- Agreed some definition clarity needed
- Disagreement for materials that are and are not considered advanced materials, without additional context.
- General agreement when context given.
- Time evolution of advanced materials is critical.
- Concerns regarding marketing and reality.

Uses of "Advanced Materials"



Which Terms require definitions?

81% of Respondents – Advanced Materials
52% of Respondents – Emergent Materials
26% of Respondents – Unique Materials
30% of Respondents – Other

Other Terms Suggested:

- Novel Materials
- Quantum Materials

Review of Prior Activities (contd.)

- Revisited “core-terms” & challenges
- Working definition & Circular discussions
- Targeted broader external outreach for future discussions.
- Discussions on advanced materials in the context of advanced technologies



ISO TC 229/ANSI: Outreach Survey on Advanced & Emergent Material Terminology



ISO Technical Committee 229 has formed an study group on advanced and emergent materials to help identify and resolve (where appropriate) terminology issues in material innovations related to nanotechnologies. As part of this effort we are seeking input from external stakeholders and subject matter experts to ensure that any term considered for development adequately addresses the broader communities.

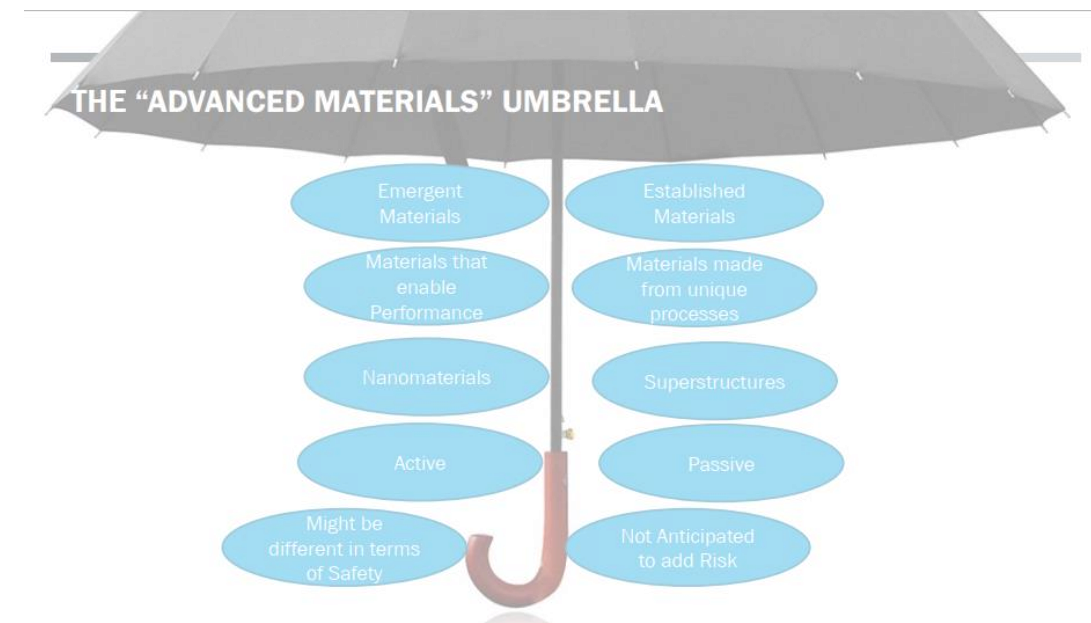
If you are a subject matter expert, a stakeholder, and/or an interested party please fill out the following short survey aimed at identifying the broader scientific, technical and social view of select-terms and definitions related to advanced and emergent materials.



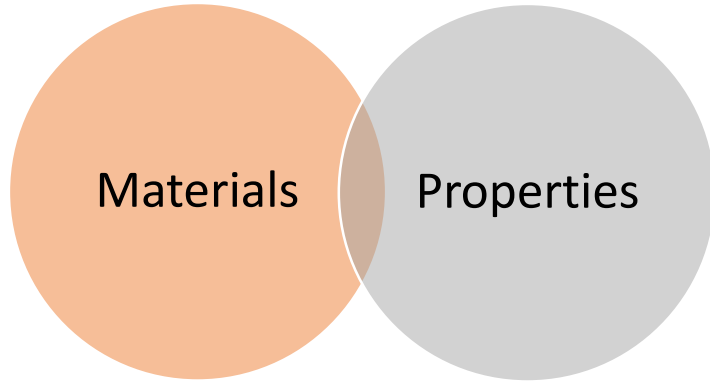
advanced material - material with enhanced properties or improved performance over conventional materials

Note to entry 1: Material refers to the substance or composition resulting in (or predominantly contributing to) the property or performance enhancement.

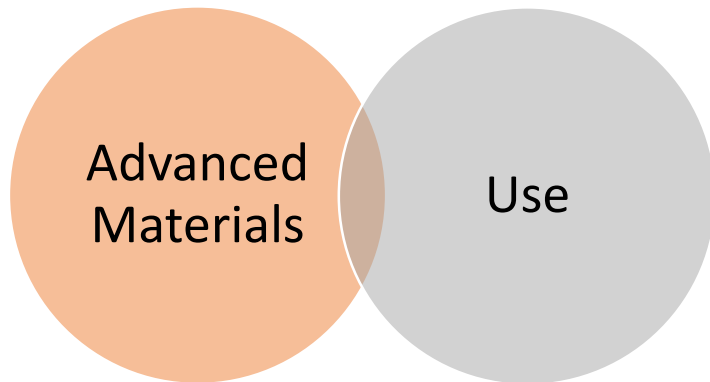
Note to entry 2: The referenced conventional material comparison is made at the same point in time.



A Perspective from Outreach & Broad Conversations



- Materials have properties, but no specified use



- Without a specified use you cannot judge performance.
- If the use is for a conventional technology is the material still advanced?
- If a material is created from an advanced technology and used for conventional purposes is it advanced?

DAMADEI – Design and Advanced Materials As a Driver of European Innovation.

Are the European Design and Advanced Materials sectors connected?

Project rationale
Several recent reports demonstrate that creative industries have a recognized important and transformative role in the EU's economy.

Creative industries are often defined as the main drivers of innovation and encompass an even bigger potential. In this regard, design is a powerful tool for innovation in new or emerging markets where user-friendly and appealing design is a must to create or enter the market.

- ACTIVE MATERIALS
- ADVANCED COMPOSITES
- ADVANCED MANUFACTURING
- ADVANCED TEXTILES AND FIBERS
- COATINGS
- GELS AND FOAMS
- HIGH PERFORMANCE POLYMERS
- LIGHT ALLOYS
- NANOTECHNOLOGY

Advanced Materials and Advanced Technologies tend to go hand & hand.



Advanced Technologies for Industry
the essentials for a strong European economy



OECD Science, Technology and Industry Working Papers
2020/02

Patterns of innovation,
advanced technology use
and business practices
in Canadian firms

Fernando Galindo-Rueda,
Fabien Verger,
Sylvain Ouellet

Advanced Technology Definitions

(US Census Bureau)



You are here: [Census.gov](#) > [Business & Industry](#) > [Foreign Trade](#) > Reference Codes

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Advanced Technology Product Code Descriptions

General Advanced Technology Product Definitions	
Code	Definition
(01) Biotechnology	Focuses on medical and industrial applications of advanced scientific discoveries in genetics to the creation of new drugs, hormones and other therapeutic items for both agricultural and human use.
(02) Life Science	Concentrates on the application of scientific advances (other than biological) to medical science. Recent advances, such as nuclear resonance imaging, echocardiography, and novel chemistry, coupled with new production techniques for the manufacture of drugs have led to many new products for the control or eradication of disease.
(03) Opto-Electronics	Encompasses electronic products and components that involve the emitting and/or detection of light. Examples of products included are optical scanners, optical disc players, solar cells, photo-sensitive semiconductors and laser printers.
(04) Information & Communications	Focuses on products that are able to process increased volumes of information in shorter periods of time. Includes central processing units, all computers and some peripheral units such as disk drive units and control units, along with modems, facsimile machines and telephonic switching apparatus. Examples of other products included are radar apparatus and communication satellites.
(05) Electronics	Concentrates on recent design advances in electronic components (with the exception of opto-electronic components) that result in improved performance and capacity and in many cases reduced size. Products included are integrated circuits, multi-layer printed circuit boards and surface-mounted components such as capacitors and resistors.
(06) Flexible Manufacturing	Encompasses advances in robotics, numerically-controlled machine tools, and similar products involving industrial automation that allow for greater flexibility to the manufacturing process and reduce the amount of human intervention. Includes robots, numerically controlled machine tools and semiconductor production and assembly machines.
(07) Advanced Materials	Encompasses recent advances in the development of materials that allow for further development and application of other advanced technologies. Examples are semiconductor materials, optical fiber cable and video discs.
(08) Aerospace	Encompasses most new military and civil helicopters, airplanes and spacecraft (with the exception of communications satellites that are included under Information & Communications Technology). Other products included are turbojet aircraft engines, flight simulators and automatic pilots.
(09) Weapons	Primarily encompasses products with military application. Includes such products as guided missiles and parts, bombs, torpedoes, mines, missiles, rocket launchers and some firearms.
(10) Nuclear Technology	Encompasses nuclear power production apparatus. Includes nuclear reactors and parts, isotopic separation equipment and fuel cartridges. Excludes nuclear medical apparatus, which is included under Life Science Technology.



— UN SECRETARY-GENERAL'S — STRATEGY ON NEW TECHNOLOGIES



SEPTEMBER 2018



SECRETARY-GENERAL'S STRATEGY ON NEW TECHNOLOGIES

GOAL

To define how the United Nations system will support the use of these technologies to accelerate the achievement of the 2030 Sustainable Development Agenda and to facilitate their alignment with the values enshrined in the UN Charter, the Universal Declaration of Human Rights and the norms and standards of International Laws.



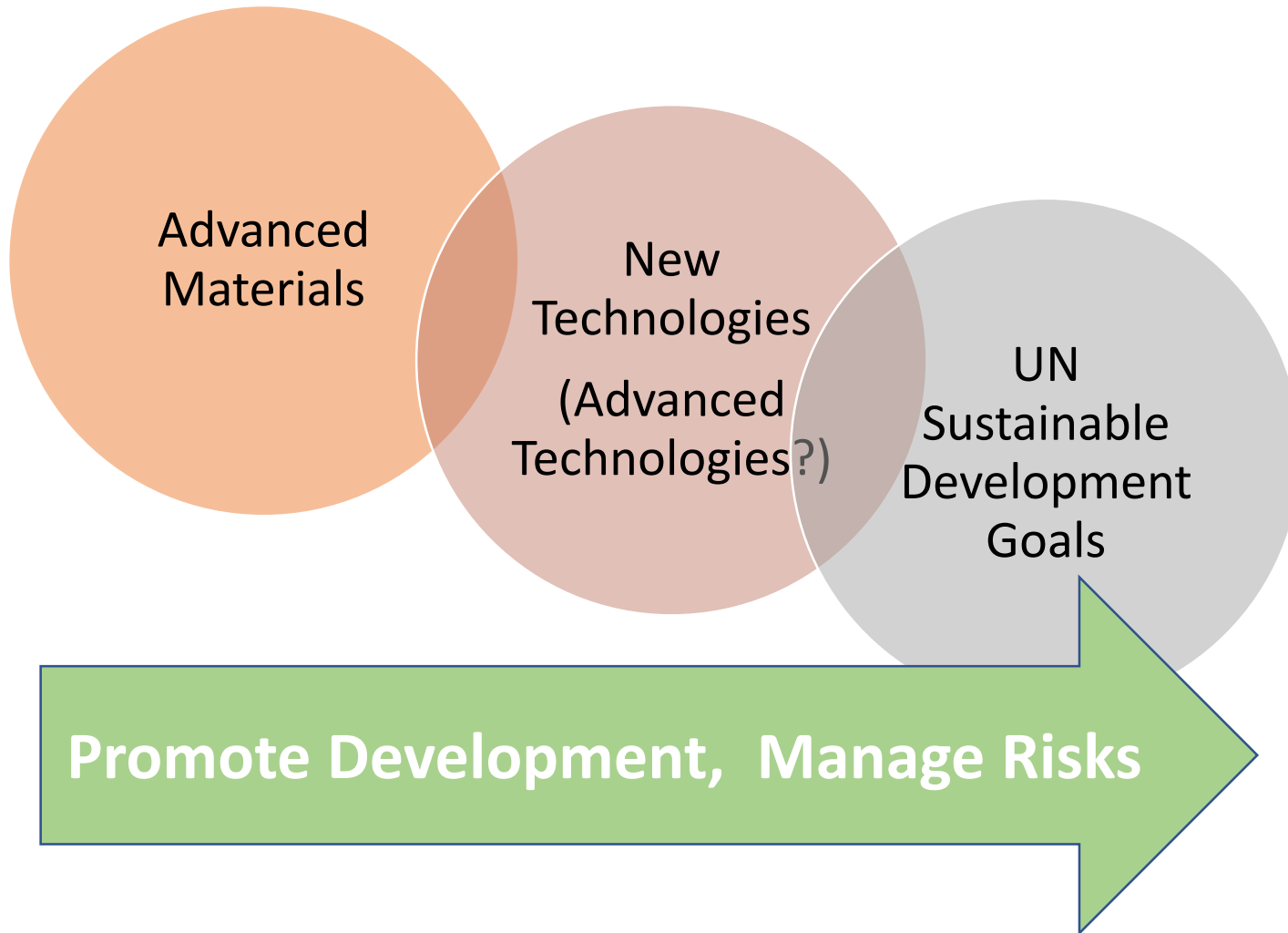
PRINCIPLES

- 1 Protect and promote global values
- 2 Foster inclusion and transparency
- 3 Work in partnership
- 4 Build on existing capabilities and mandate
- 5 Be humble and continue to learn

COMMITMENTS

- 1 Deepening the UN's internal capacities and exposure to new technologies
- 2 Increasing understanding, advocacy and dialogue
- 3 Supporting dialogue on normative and cooperation frameworks
- 4 Enhancing UN system support to government capacity development

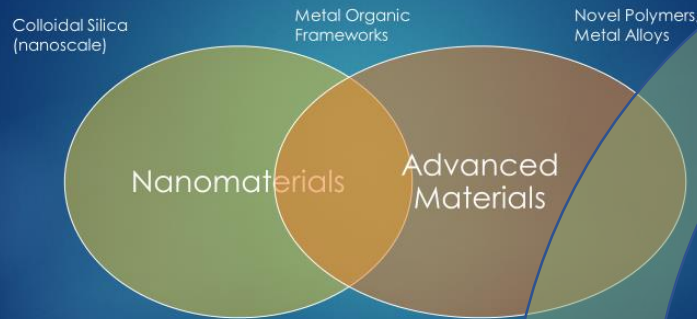
Moving along the path....



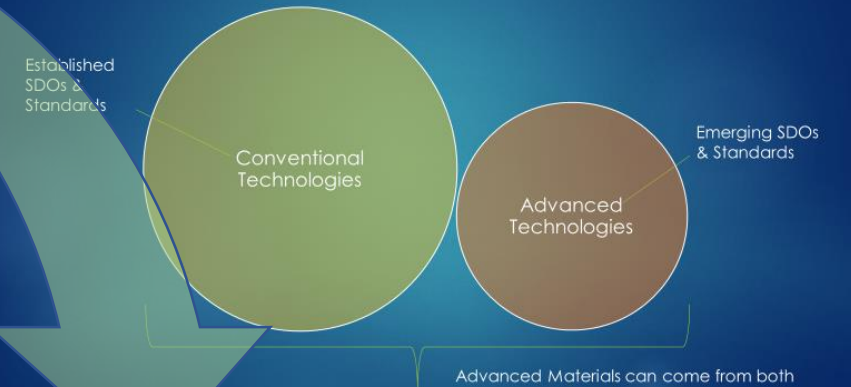
“Today, technological change is driven largely by private companies, making it harder for social scientists, policymakers, Governments and legislators to keep up. Major innovations that occurred earlier in the life of the United Nations, such as the harnessing of atomic energy and manned space exploration, were made under government auspices. During that period, national and international policy kept pace better.”

- Deepen the United Nations internal capacities and exposure to new technologies;
- Increase understanding, advocacy and dialogue around new technologies;
- Support dialogue on normative and cooperation frameworks; and
- Enhance United Nations system support to government capacity development in these areas.

Overlaps & Distinctions



Advanced Materials & Technology



Full Circle...

Readiness Levels Important to Trade & Commerce



Societal Drivers for Advanced Materials ...

Commitments to UN Sustainability Goals

-Advanced Materials are essential to progress

Decision making is based on both perceived and actual risks

- Uncertainty in regulatory compliance or acceptance matters

Are there gaps and risks that standardization can help address to enable to deployment and adoption of the best solutions?



2021 ISO TC 229 Plenary Meeting SG Outcome

- Document to be prepared by ANSI sub-team for review in May ISO TC229 Interim meeting.
- Draft document (**not an official ISO work item**) completed currently circulating in US TAG for further comment:
“Nanotechnologies—Vocabulary—Innovations in Materials and Technology”
- Terms & Definitions Included (basic starting point):

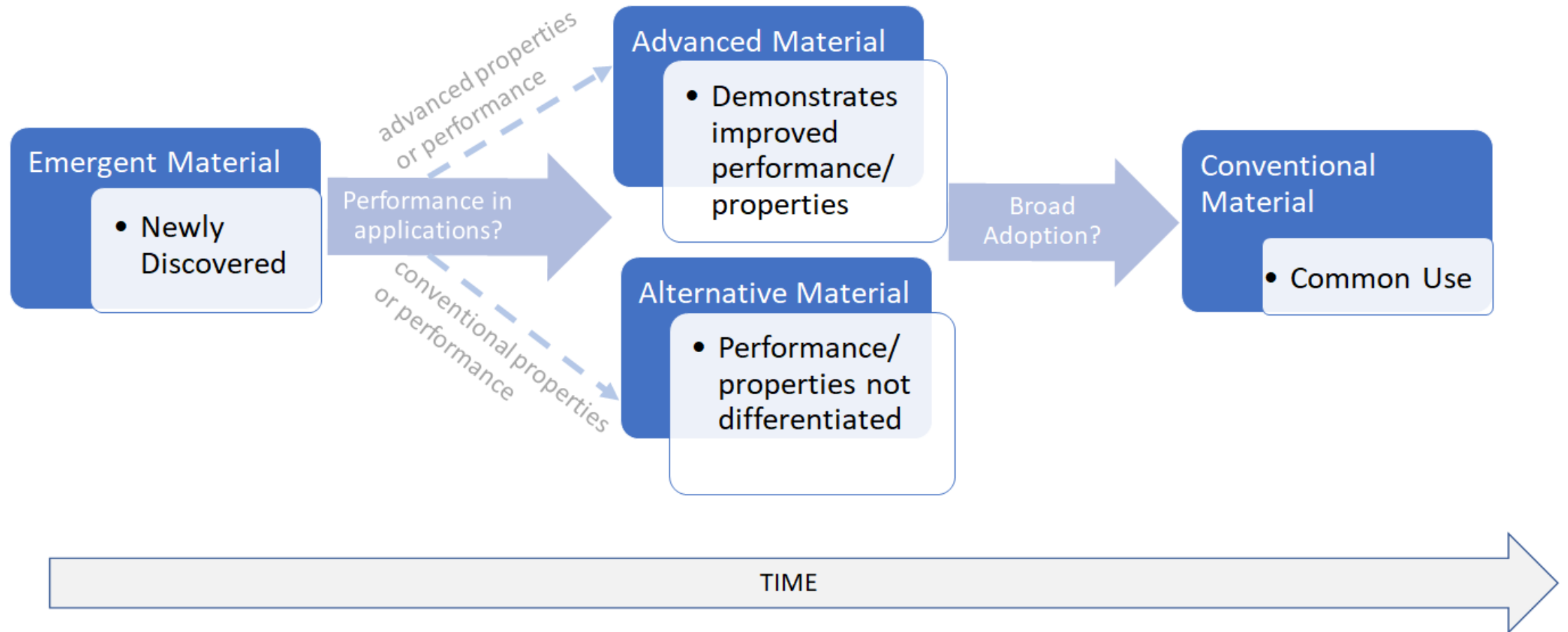
Technology

Advanced technology
Conventional technology
Displaced technology
Emergent technology
Specialty applications

Materials Innovations & Properties

Material
Conventional material
Conventional property
Alternative Material
Advanced Material
Advanced Property
Emergent Material
Emergent Properties

Preliminary Terminology Document (contd.)



Preliminary Definition of Advanced Material

5.5

advanced material

material (4.1) with significant improvements in properties or performance (4.3) for a specific application

Note 1 to entry: Some advanced materials gain their improved properties through modification of their internal or surface structure.

Note 2 to entry: Some but not all advanced materials are created by Advanced Technologies (4.2).

Note 3 to entry: Some but not all nanomaterials are advanced materials.

Note 4 to entry: Advanced materials can be, but are not always complex / highly engineered materials (5.1) .

Note 5 to entry: Materials that are considered to be advanced materials today are anticipated to be displaced or to become conventional materials in the future.

Note 6 to entry: Might include new functionality or emergent properties of a material

Note 7 to entry: significant improvements in performance and properties relate to conventional materials (when they exist)

Note 8 to entry: Used in advanced technologies or specialty applications]

Caution: This is not an official definition and will likely undergo further modifications. It is intended to be debated next week in ISO/TC 229.

Other Related Active Terminology Work Items in ISO/TC 229

ISO/AWI 80004-1 Nanotechnologies—Vocabulary—Core Terms and definitions

ISO/TS 4958 Nanotechnologies—Vocabulary—Liposome Terminology

ISO/TS 80004-13 Nanotechnologies—Vocabulary—Part 13: Graphene and related two dimensional (2D) materials

Concluding Remarks

- ISO/TC 229 and ANSI have been active in identifying needs, nuances and issues related to advanced materials terminology.
- A Study Group was formed in 2020 (several discussions & surveys conducted)
 - A draft terminology document has been generated and further input is sought.
 - Study Group discussion to occur on May 13th during ISO/TC 229 Interim meetings.
 - External stakeholder comments highly encouraged.
- Many existing terminology documents and ongoing work items are relevant to subsets of advanced materials.

Thank you!

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