# REALISING THE TRANSFORMATIVE POTENTIAL OF TECHNOLOGY: THE DRAFT FRAMEWORK FOR THE GOVERNANCE OF EMERGING TECHNOLOGIES

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BETTER POLICIES FOR BETTER LIVES

# We need collective action on good technology governance to reach goals and missions

**Technology governance rationales**

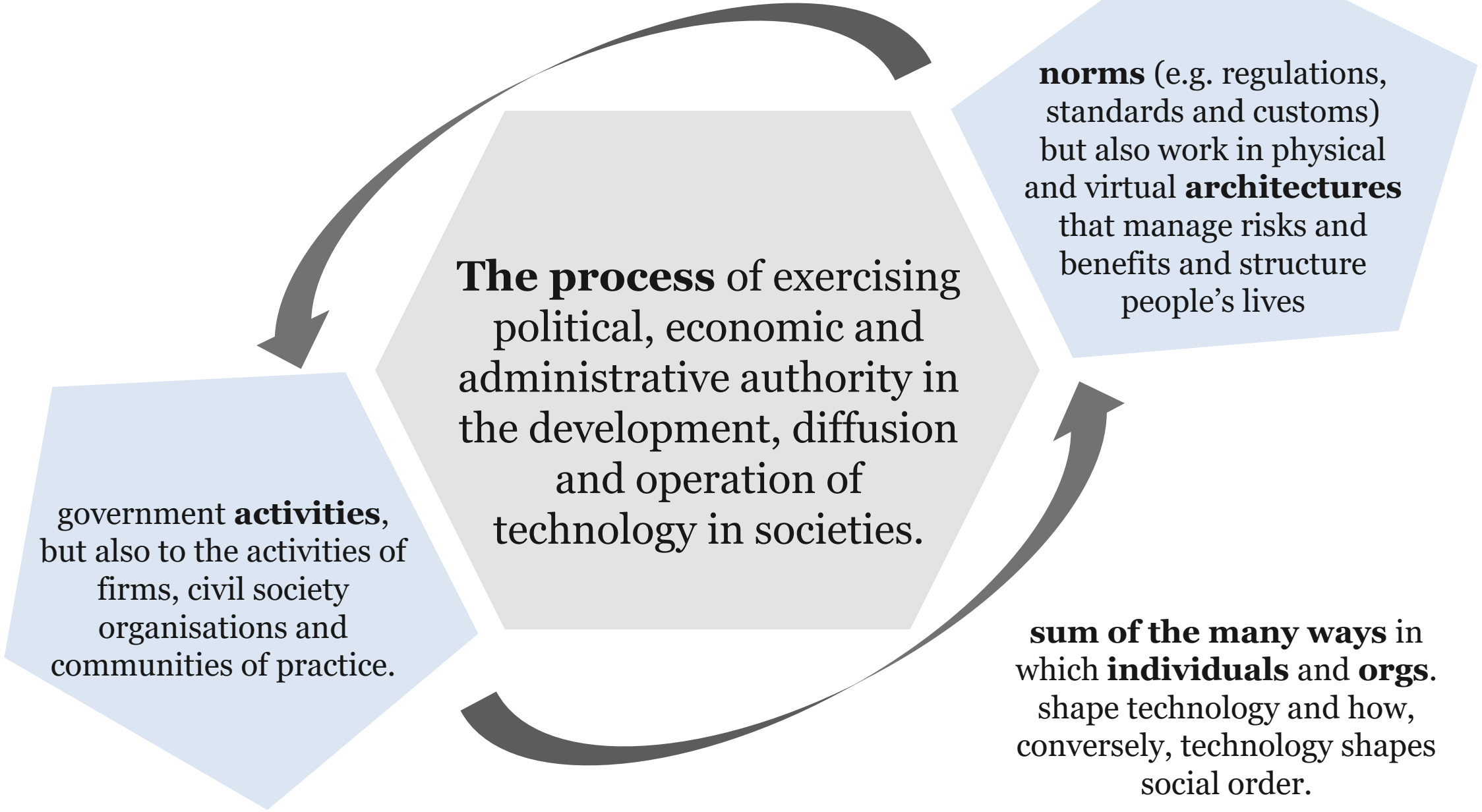
- Anticipate and mitigate social and political disruptions
- Safety, security and democratic risk management
- Tech divides and rising inequalities
- Public trust and public acceptance deficits in S&T
- Inadequate alignment of technology and societal goals

# Tech governance: on the OECD agenda

*Advances in science and technology are among the most important drivers of productivity, growth, and improvement in living standards.* ***These advances must be shaped responsibly through effective governance to ensure their benefits are distributed equitably and the risks are successfully managed****…We recognise the need to develop and strengthen standards for new and emerging technologies that reflect our shared values and keep pace with innovations reshaping our economies and societies.*

**-- Statement, Meeting of the OECD Council at the Ministerial Level 2021**

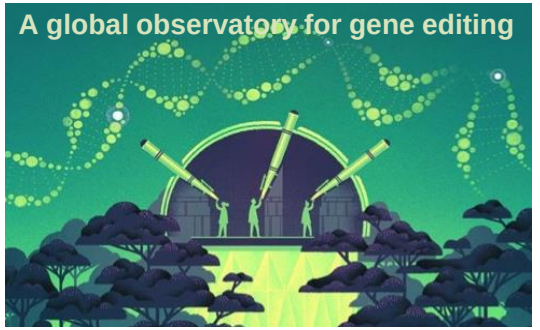
# “Technology governance” definition



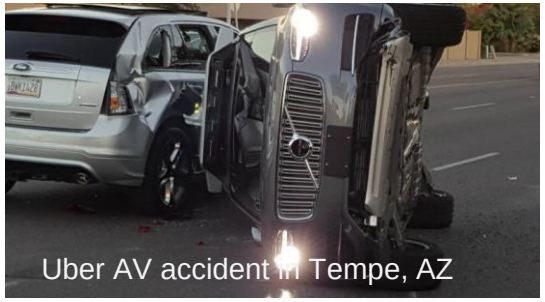
# Governance challenges in emerging technologies

Governing emerging technologies well must address well-known challenges :

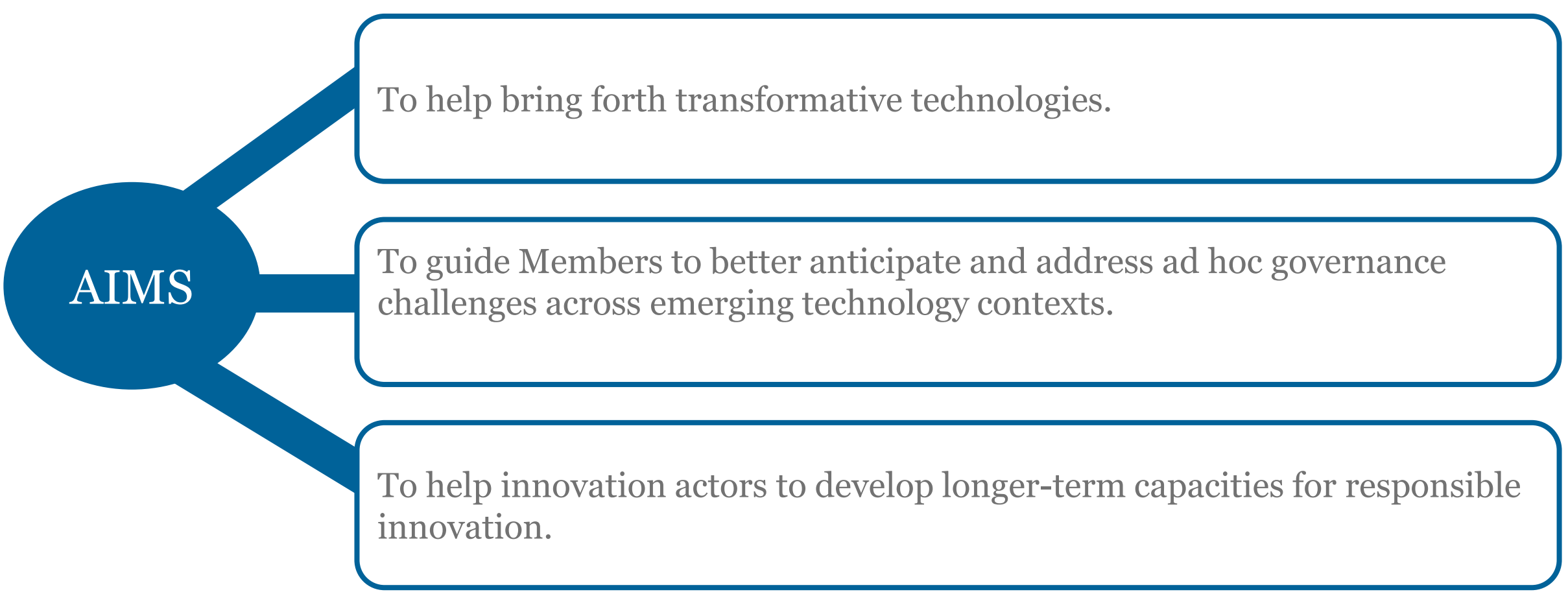
- Mismatch between the **pace** of technology development and **adaptivity** of governance  frameworks
- Increasing **convergence of technologies** leading to erosion of traditional disciplinary and regulatory lines
- **Fragmentation** of governance approaches across administrative boundaries/jurisdictions despite the fluid and cross-border nature and effects of innovation impeding efficient governance. , imped
- **Uncertainty** in the potential directions, impacts and risks of innovation.
- Growth of **public distrust** in expertise, institutions







# A framework for responsible innovation in emerging technologies



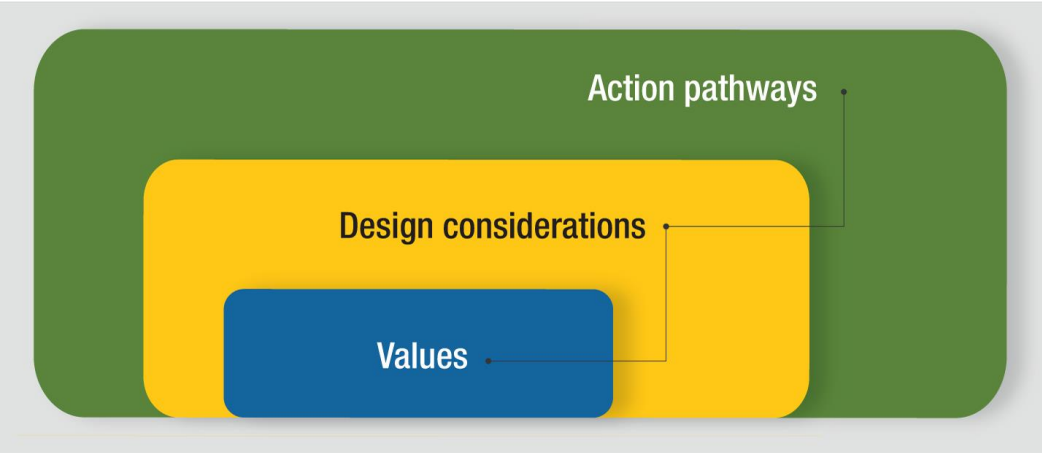
# Why “emerging technologies”

- This framework illustrates how responsible governance practices can be incorporated into decision making for *emerging technologies:*
  - where governments and other catalytic actors have particular influence on the initial speed and trajectory of technology development
  - later stages of technology governance receive more policy attention.

## Definition:

- Technologies in active development
- characterised by rapid expansion, evolution, novelty, and uncertainty in trajectory and impact.
- E.g., gene editing and synthetic biology, generative AI, immersive technologies like the metaverse, and quantum technologies.

# Framework for the governance of emerging technologies




I. Intro: Definition, aims, methods, structure

**II. Values** [Foundational, Tech-specific]

**III. Design considerations**

**IV. Action pathways and toolsets**

I. Appraising technology for policy

II. Embedding values upstream in the innovation process

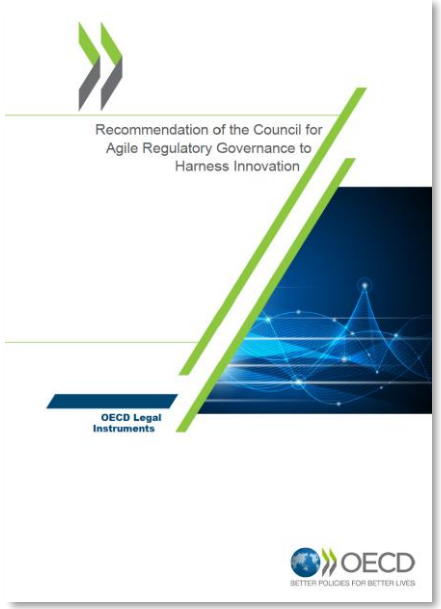
III. Engaging society and stakeholders

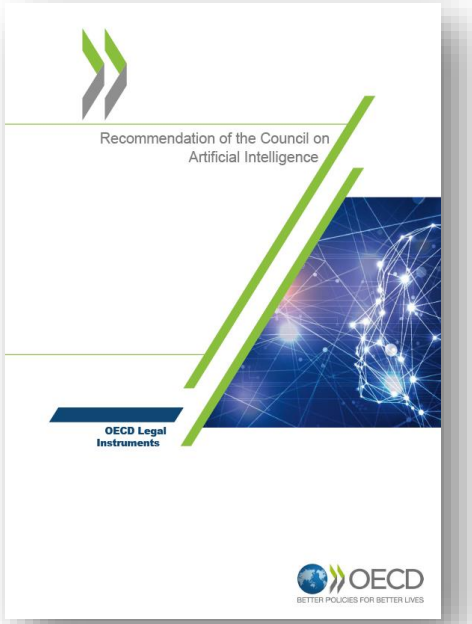
IV. Developing guidelines and regulation

V. Key role of the private sector

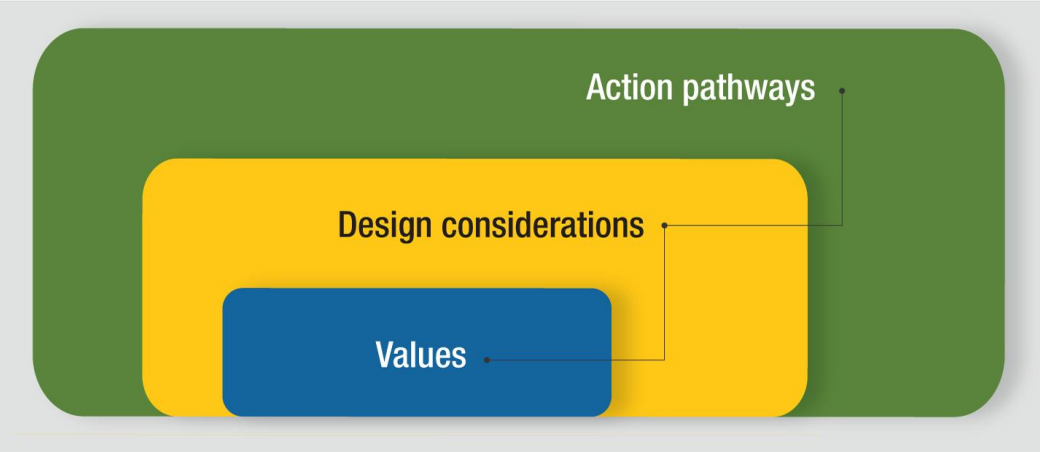
# Framework development: method and key sources

- Recommendation of the Council on Artificial Intelligence (*OECD/LEGAL/0449*)
- Recommendation of the Council on Responsible Innovation in Neurotechnology *(OECD/LEGAL/0457)*
- Recommendation for Agile Regulatory Governance to Harness Innovation *(OECD/LEGAL/0464)*

# Framework structure: three interwoven components

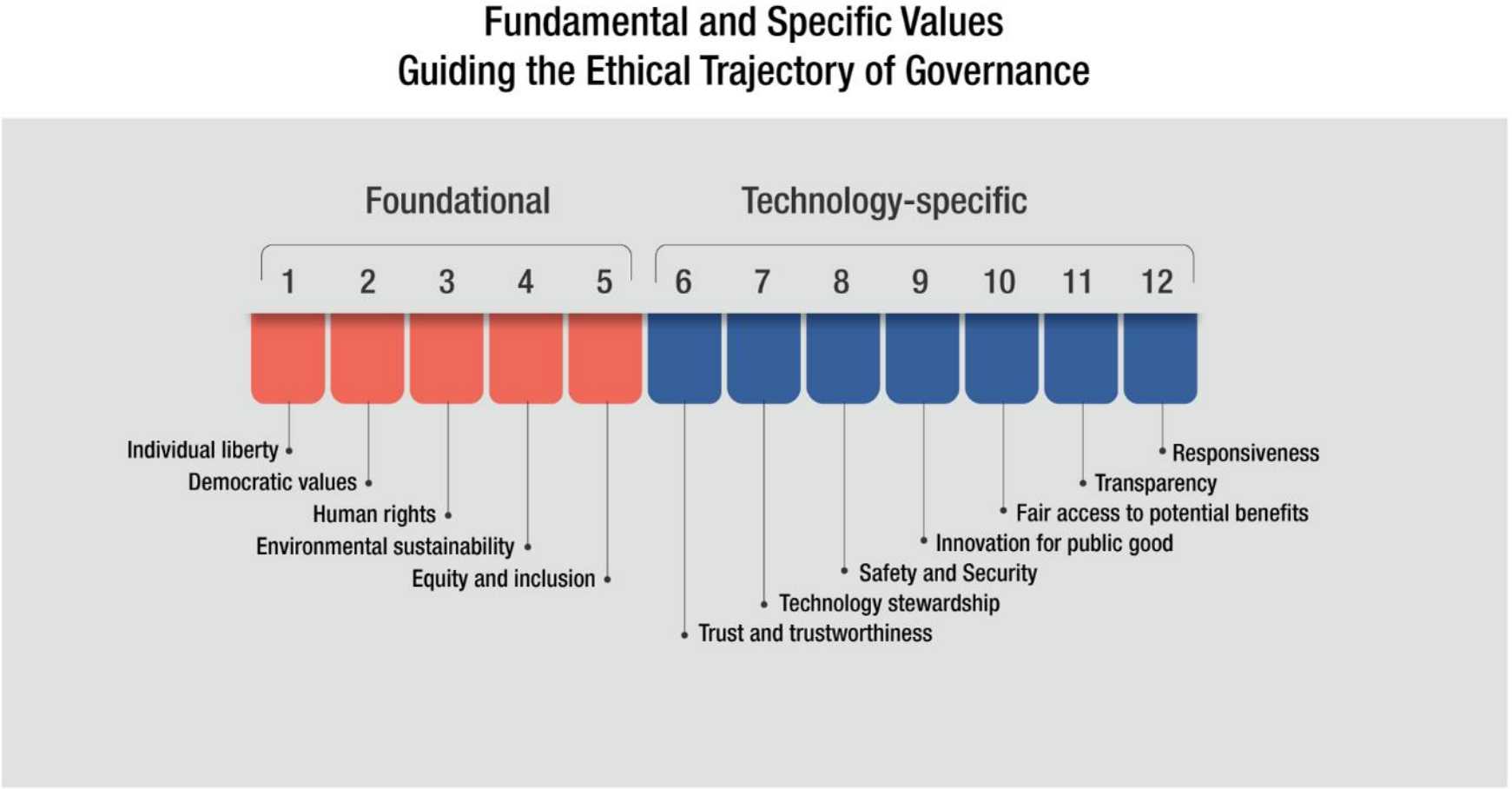



- **Values**: high-level ethical considerations, cultural and professional norms, and shared commitments.
- **Design considerations**: intermediary guidance at a “middle layer” that can help shape the policies and actions necessary for responsible innovation
- **Action pathways**: sequences of policy action and toolsets that help advance the process of developing responsible technology

# Values in responsible innovation (1/2)

| | |
|---|---|
| Continuous | Values should be reflected throughout the technology lifecycle, not merely as an aspirational initial statement |
| Dynamic | They are to be used to enable and encourage responsible practices and to limit or restrict irresponsible practices. |
| Constitutive | Moral and political basis for the priorities and trade-offs that are a feature of all governance decisions. |
| Combinatorial | It is their joint use that is the approach described here for responsible innovation |

# Values in responsible innovation (2/2)



# Actioning specific values pertinent to the technology governance context

**Specific values**
pertinent to the respective technology governance context

**Trust and trustworthiness**, including ensuring that actors and their decisions can be counted on for accuracy, reliability and compliance

**Technology stewardship**
responsibility to use technology for future benefit

**Safety and security**
involves the adoption of measures to minimize risk of harm to well-being and environment

**Innovation for public good**
the important benefits to society from technology innovation

**Accountability**
including holding specific actors responsible for giving a legitimate account for actions they take on behalf of others

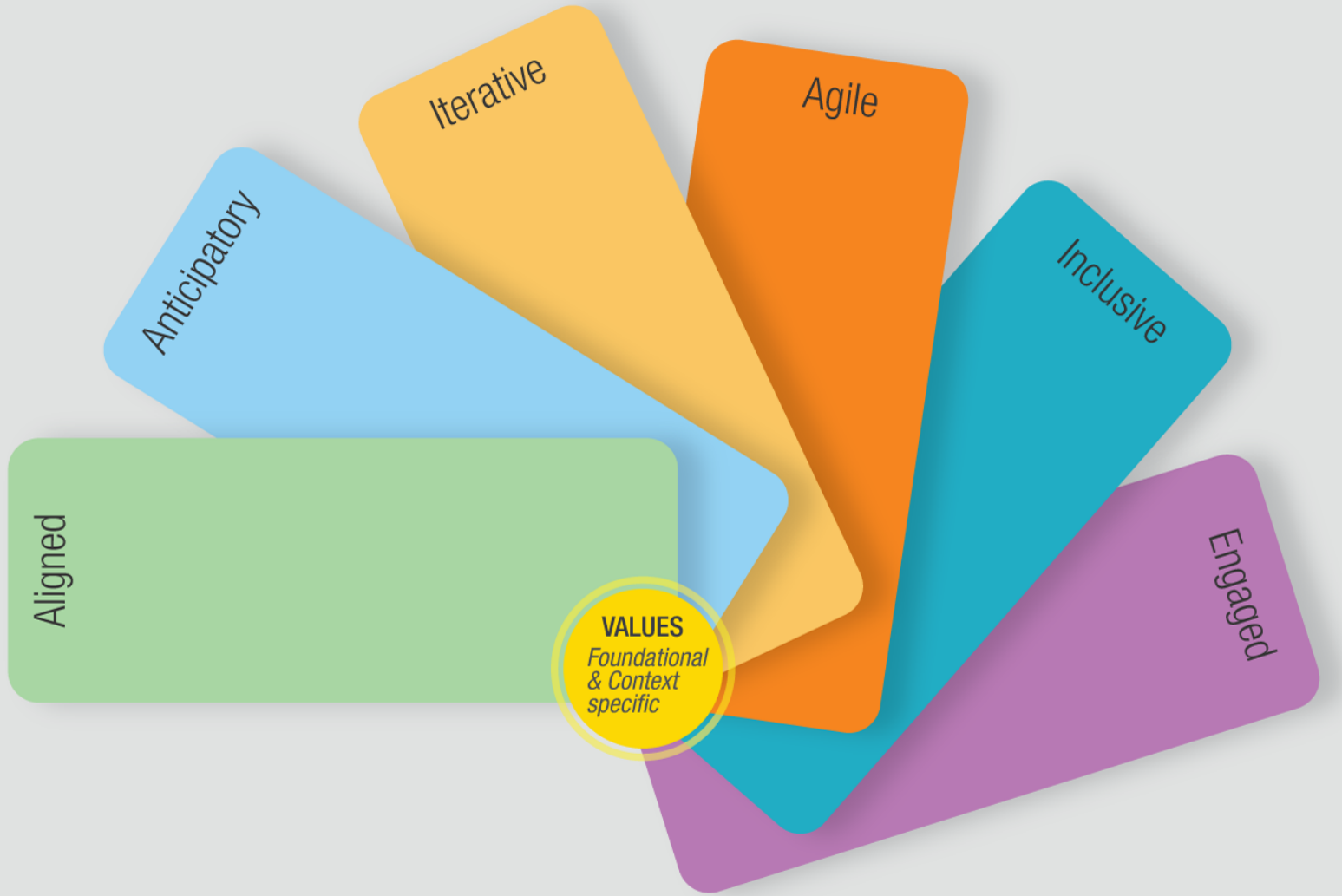
**Fair access to potential benefits of technology** refers to giving due consideration to equitable distribution of benefits of tech

**Transparency**
to give an open and honest description of information conveyed, its justification, and limitations

**Responsiveness**
meet the expectation that promised outcomes are delivered

# Key considerations for technology governance

- Design considerations act as “middle layer” by shaping the responsible innovation pathway and ensuring that core values are integrated into technology development.



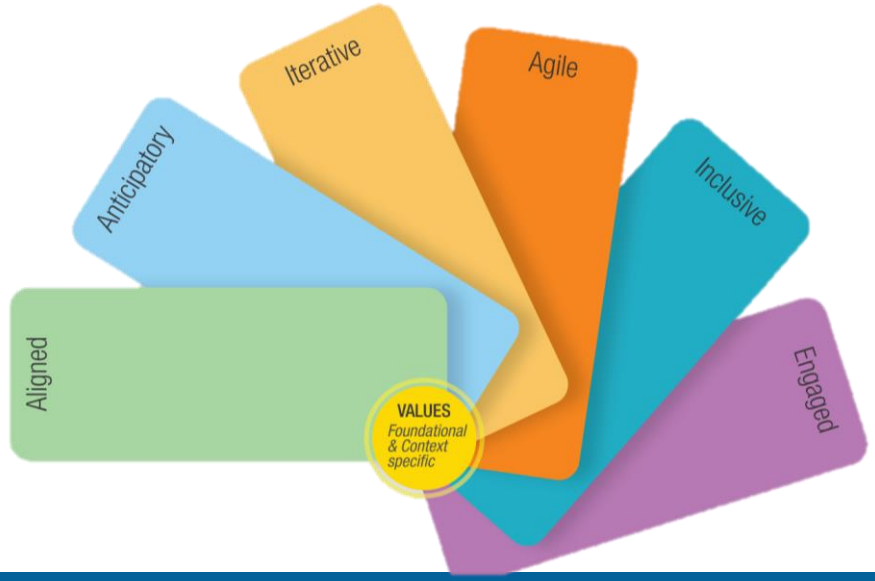
# Design considerations in focus (1/2)

## Aligned

Innovation actors should seek to align technological development with institutional and social values to maximise benefits of innovaton as well as produce more support among stakeholders and in society.

## Anticipatory

With pot. disruptive or transformative technology fields, forward-looking anticipatory approaches are required. They enable the identification, upstream, of desirable futures outcomes, potential risks, risk benefit trade-offs and dilemmas.




## Iterative

Iterative governance avoids the phenomenon of 'locked-in' thinking, where decisions are regarded as settled regardless of the presence of new information. It encourages a learning approach to governance, as actors revisiting choices and decisions.

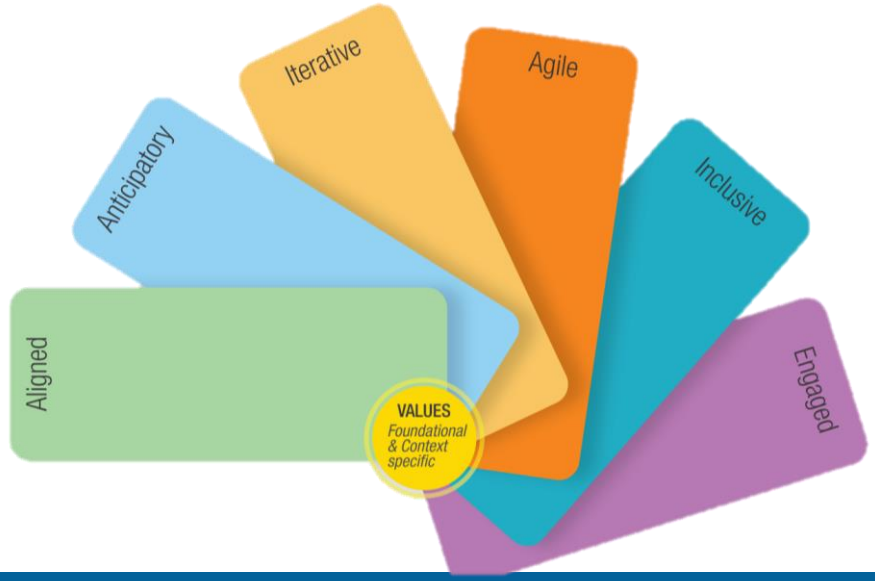
# Design considerations in focus (2/2)

## Agile

Agility – adaptivity, forward-looking, innovation-friendliness – confronts the evolving nature of information related to emerging technology and their application.

## Inclusive

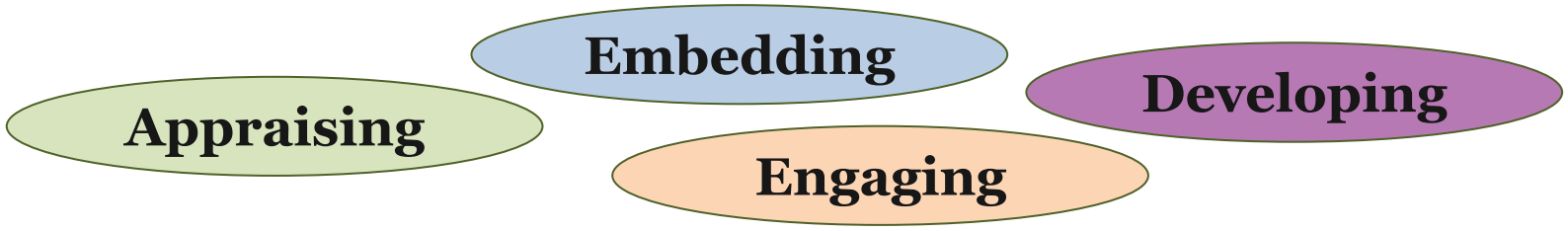
Inclusivity – in terms of outcome and process - in the technology governance context sets out to bridge divides and increase equity and equality of opportunity with respect to technology futures.

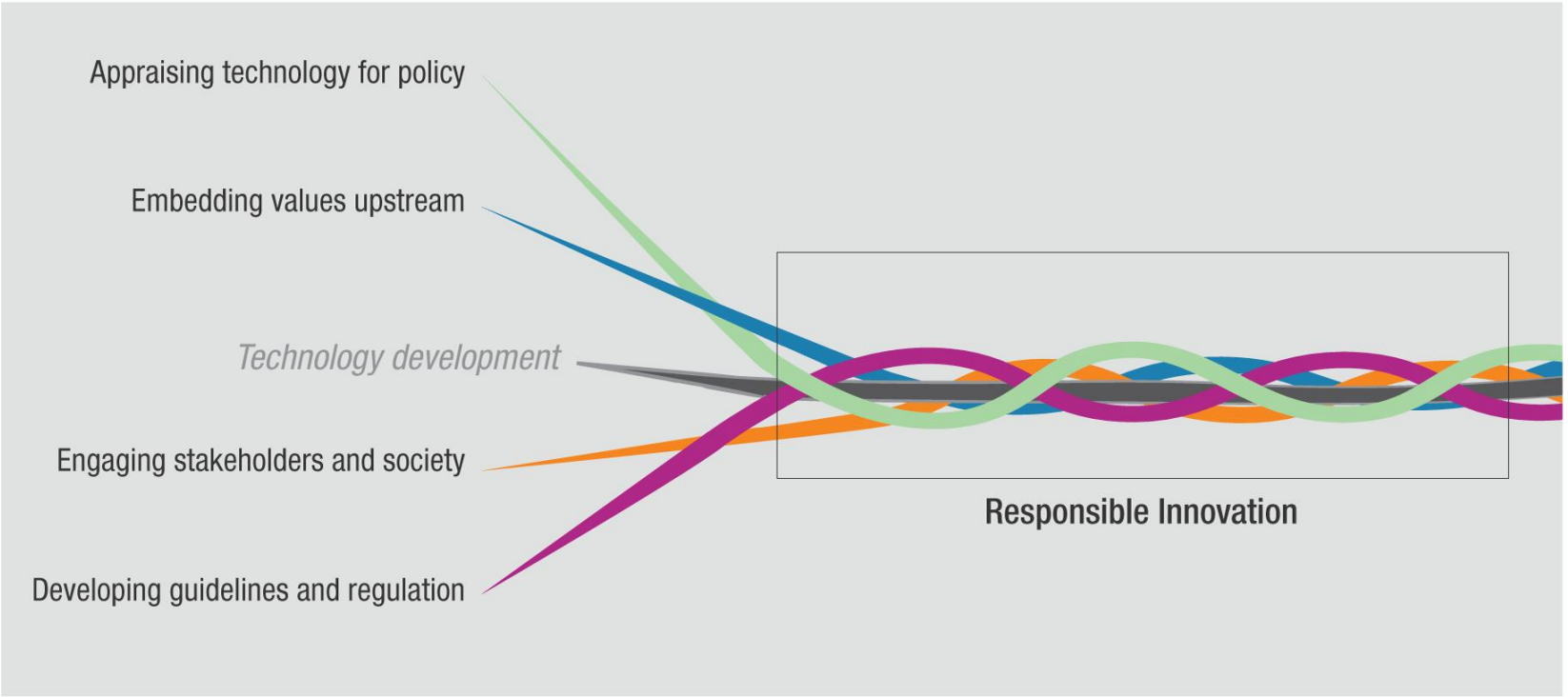



## Engaged

Engagement with stakeholders and society can surface societal goals at different points in the innovation system, identify public sensitivities before they become divisive, and promote public understanding of science and technology.

# Interconnected pathways for responsible innovation



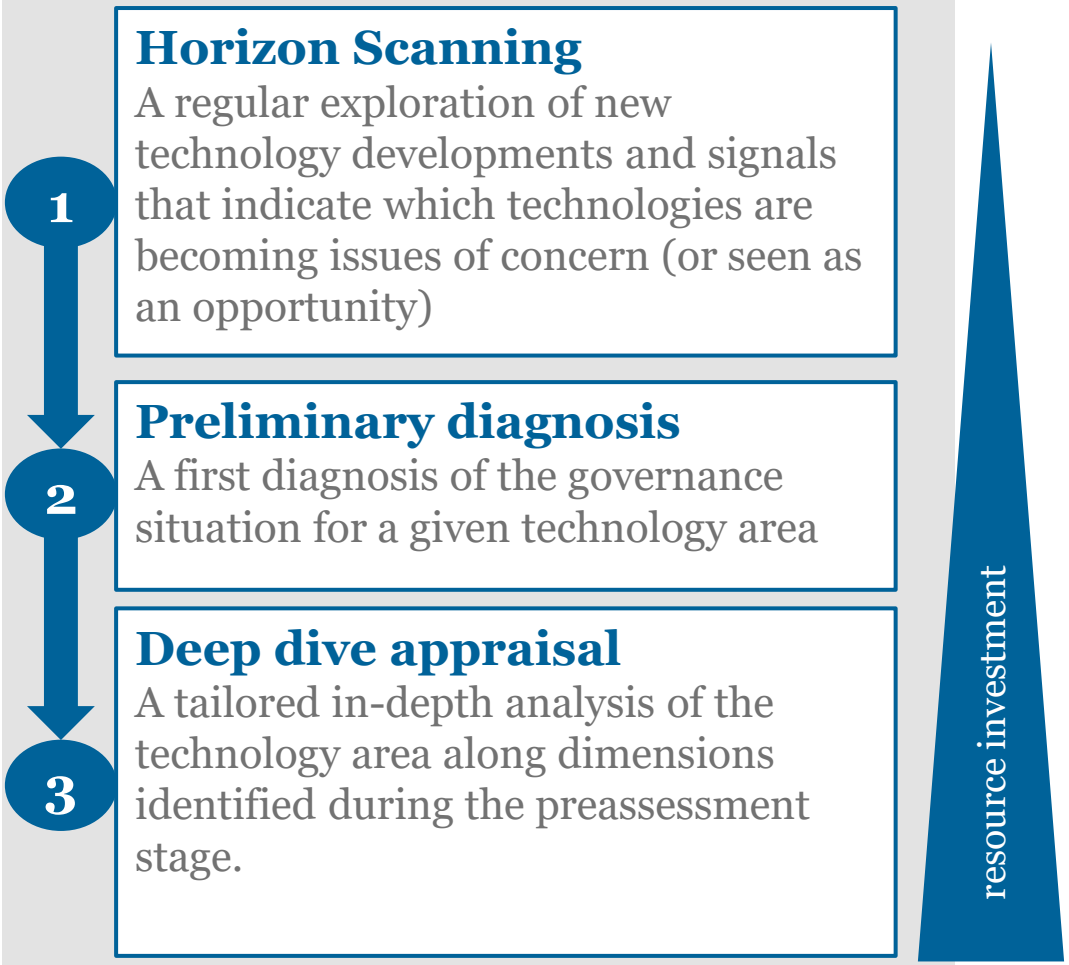




- **Sequences of policy action** that help advance the responsible technology development process
- **Associated tools in** each action pathway, which help fulfil the design considerations
- **Interrelated processes** rather than one-time actions.
- **Can iterate** at different key points of leverage in the innovation process.

# Pathway 1: appraising technology for policy

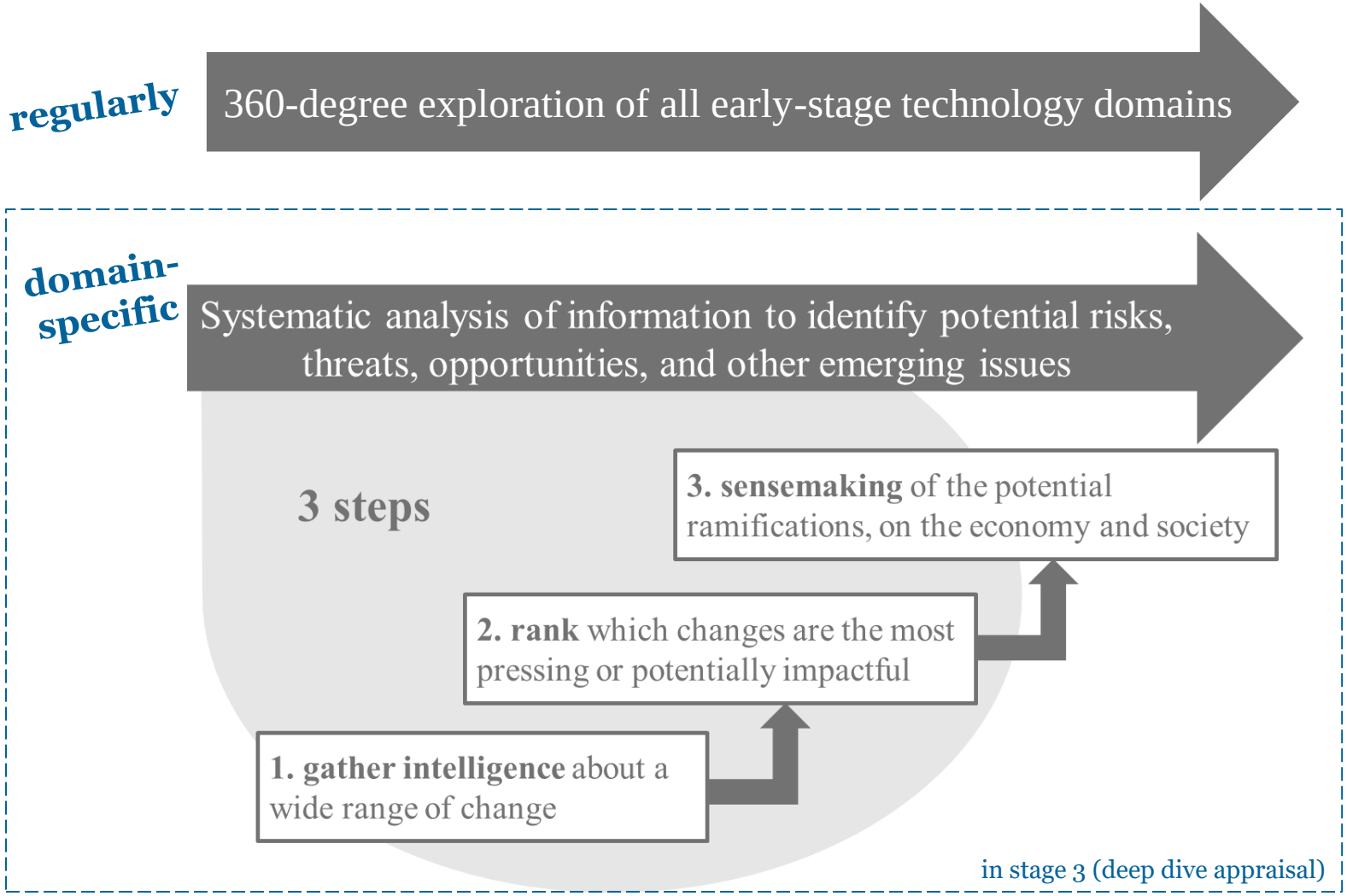
- A **multi-faceted process** to understand:
  - the emerging technology domain
  - potential directions of development
  - possible ethical and societal aspects
  - potential impacts and risks
- Requires both set of **tools** and a **general capacity**.
- A key function: identify (and involve) **stakeholders** who should participate in the appraisal process.
- Does not involve decision making; rather, it provides **strategic intelligence** to understand an emerging field and **inform decision-making**.
  - for knowing when, who and what policy options should be applied given a particular technology case
  - when certain levels of governance or tools might be triggered.

## Three tech appraisal stages



# Pathway 2: appraising technology for policy

## Stage 1: Horizon scanning




### Goal

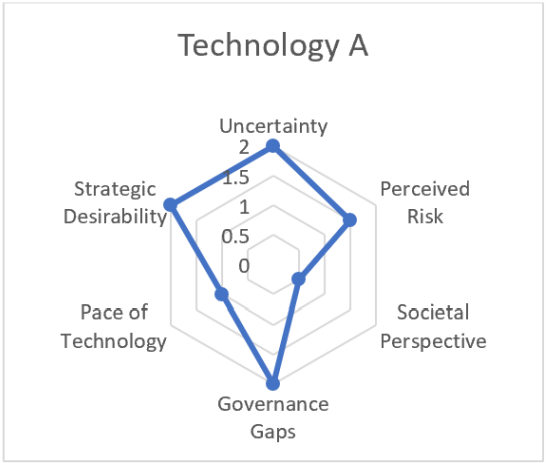
**Understand** key drivers of change and how they may evolve

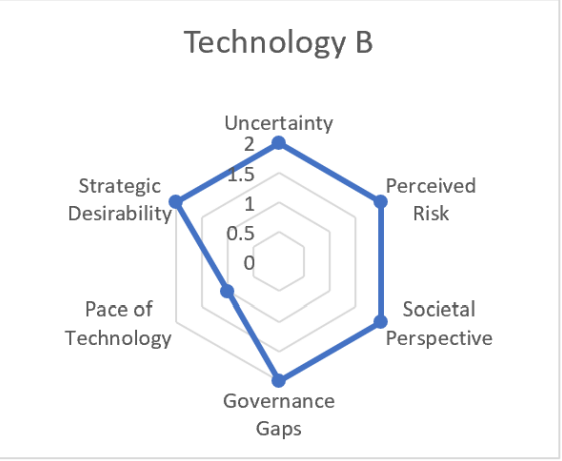
**Detecting early signs** of potentially important developments (early or weak signals, emerging trends, problems)

# appraising technology for policy (2/4)

## Stage 2: Preliminary diagnosis

Positioning the tech domain relative to six dimensions

# Pathway: appraising technology for policy (2/4)

## Stage 2: Preliminary diagnosis

Positioning the tech domain relative to six dimensions


### Goal

**decide** whether further policy action is needed

**assess** extent to which this is an emerging technology of concern

# Pathway: appraising technology for policy (4/4)

## Stage 3: Deeper dive technology appraisal

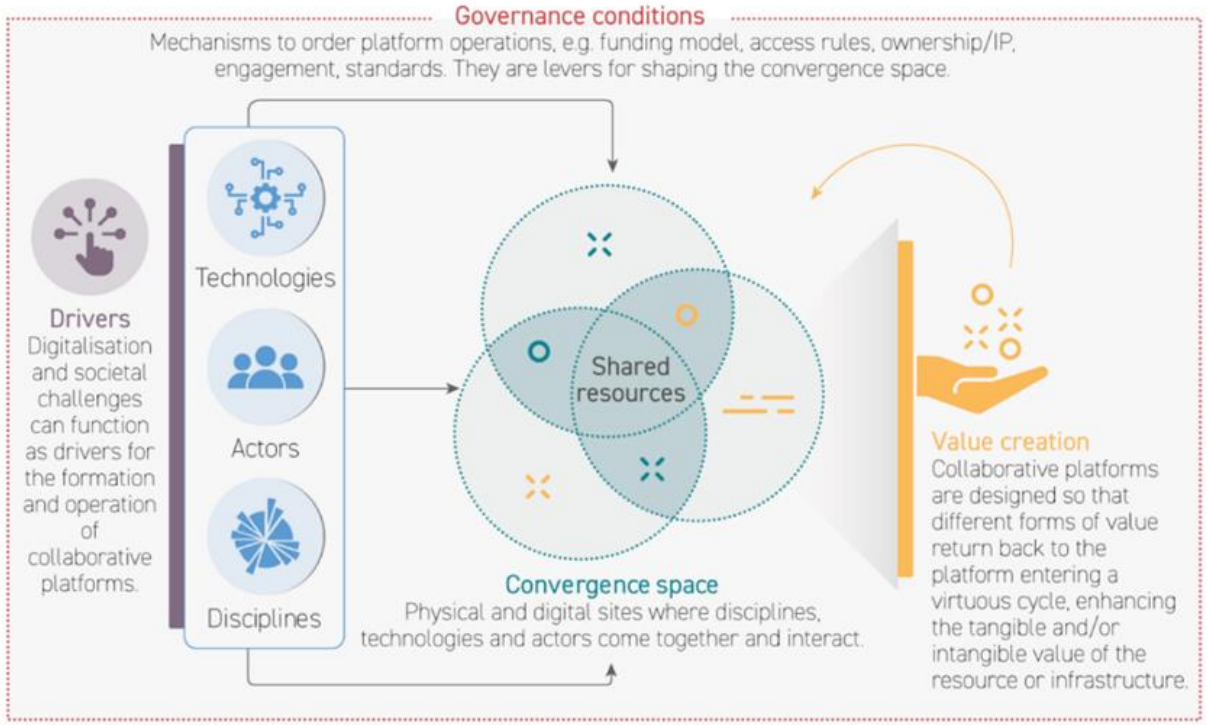
Use of tools to address identified knowledge gaps

| Tool/approach | Insights & link to diagnosis dimensions |
|---|---|
| Domain-specific horizon scanning | can reduce **uncertainty** by creating a rich picture of expert expectations of how a technology domain will unfold in the near, medium and long-term. |
| Forecasting | can provide an indication of the **pace** of technology and identify key **stakeholders**, make explicit their expectations on how the field is likely to unfold over time |
| Foresight | Can make explicit alternative futures, articulation of desirable futures, anticipate on how technology is embedded in society; informs the **social license** and the **strategic importance** dimensions |
| Technology Assessment | can reveal **governance gaps** in technology development and application perspectives, by revealing stakeholder perspectives, informs the **social license** dimension |
| Early-stage risk assessment | Can stress test existing risk assessment and regulatory approaches, informs **risk** and **governance gap** dimensions |

# Pathway 2: embedding value upstream in tech development

- Actions taken early in technology development can help optimise key design considerations
- 5 key moments in technology development:

| | |
|---|---|
| Lever 1 | Orienting research and development |
| Lever 2 | Building collaborative platforms and other co-creation spaces |
| Lever 3 | Interdisciplinary technology development |
| Lever 4 | "By-design" governance approaches |
| Lever 5 | Stewardship through technology transfer |



# Pathway 3: Engaging stakeholders and society (1/2)

## Actors

contribute perspectives, concerns and ideas which could help in prioritising R&D and other decision making

**Publics/citizens**
The general population that contributes to democratic decision making but may lack direct connect to technology developments

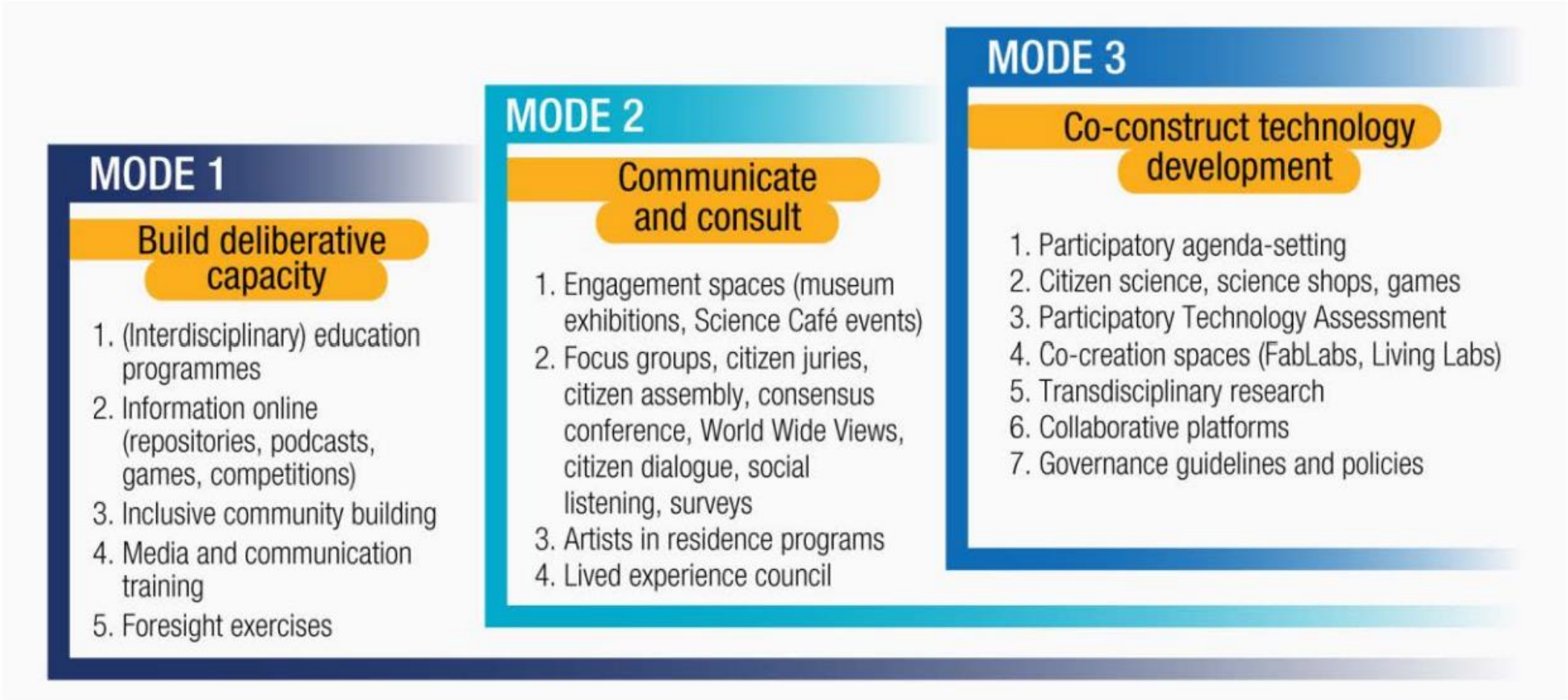
**Stakeholders**
People with direct professional or personal interest in technology development or its outcomes

gather evidence and insights, help test design validity or participate in juries

## Success factors

- **Start early and allocate adequate time**: build ownership develop trust, and ensure relevant and timely inputs; allow time for the process to unfold
- **Effective communication**: present balanced and accurate information, allow for diverse opinions, willingness to exchange perspectives among all participants
- **Frame around missions, goals and future products**: as technologies are often not yet embodied in future products or services, the engagement needs to focus on relatable issues for publics/citizens
- **Iterations and stages**: rather than one-off, iterative engagements or different stages have become more common and enable a more holistic involvement
- **Diverse inputs**: include diverse stakeholders and publics by education level, experience, race, gender and socio-economic status.
- **Transparent process**: analyse the results with all actors that were involved, keep them informed about how insights are used
- **Real impact**: translate and integrate stakeholder insights into decision-making

# Engaging stakeholders and society (2/2)




*Source: OECD STIO Outlook 2023*

# Pathway 4: Developing guidelines and regulation (1/3)

Pathway concerns the construction of norms and norm-driven oversight systems to steer technology development.

## Key considerations:

- should be designed to be **learning, agile and adaptive**
- not mutually exclusive and can be usefully **combined**
- need to be **consistent** with, and seek mutual **reinforcement from, other levers** of action, such as public procurement
- involve **trade-offs and opportunity costs** that need to be carefully assessed

## Characteristics

- *Building and improving a robust evidence base*
  - Ensure that sufficient (technical, analytical and administrative) capacity, skills and resources are available to relevant authorities
  - Leveraging new data sources and continuous monitoring to produce broader, more reliable and timely assessments of relevant impacts.
- *Learning and experimentation*
  - *Testbeds:* suitable for earlier maturity stages, focus primarily on the technical dimension of developing, testing and upscaling a product or service
  - *Regulatory sandboxes*: aimed at regulatory learning, involve a temporary loosening or modification of applicable norms

# Pathway: Developing guidelines and regulation (2/3)

## Non-binding approaches:

**Principles and guidelines.** Attractive for international, transnational and/or global actors to make moral and political commitments.

**Technical norms and standards.** determine the specific characteristics of a product, process, or production method. Can emanate from the private, public or both in collaboration.

**Codes of conduct** are organizationally codified values and/or behaviours that seek to shape professional norms by communicating clear expectations. Form of self-governance.

## Success factors

- **Monitor and assess** their performance and effects
- Deploy appropriate **oversight** to prevent undue influence of interested actors
- Acquire a precise understanding of the set of **incentives** that underpin participation in voluntary regimes
- Use the potential of technical standard development processes to facilitate responsible innovation by fostering **co-operation** among innovators
- **Closely monitor** practices and engage in **regular reviews** in an open and inclusive way to avoid inappropriate market distortions.
- **Define credible sanction mechanisms** to prevent and address potential misconduct

# THANK YOU

# Pathway: appraising technology for policy (2/4)

## Stage 1: Horizon scanning (domain-specific)

Systematic analysis of information to identify potential risks, threats, opportunities, and other emerging issues

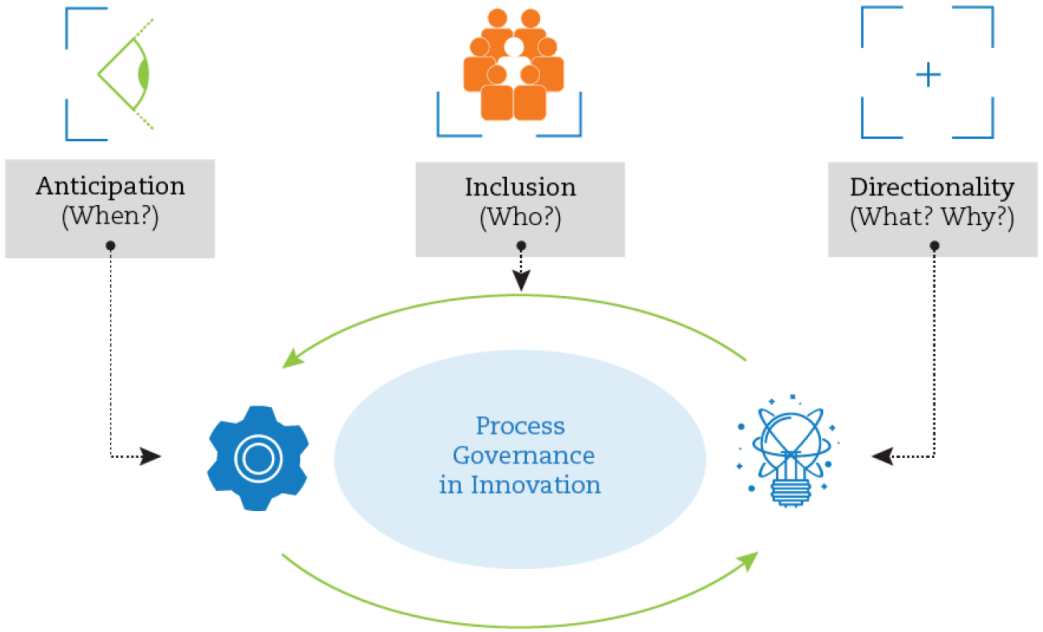
3 steps

1. **gather intelligence** about a wide range of change
2. **rank** which changes are the most pressing or potentially impactful
3. **sensemaking** of the potential ramifications, on the economy and society

### Goal

**Detecting early signs** of potentially important developments (early or weak signals, emerging trends, problems)

# Embedding values “upstream” in the innovation process




OECD 2018

**OECD/STI response: soft law**


OECD 2019