D2.1: Identification of different value chains valuable for high-tech photonics SMEs

Assessing opportunities for photonics in a non-photonics field using a value chain analysis tool

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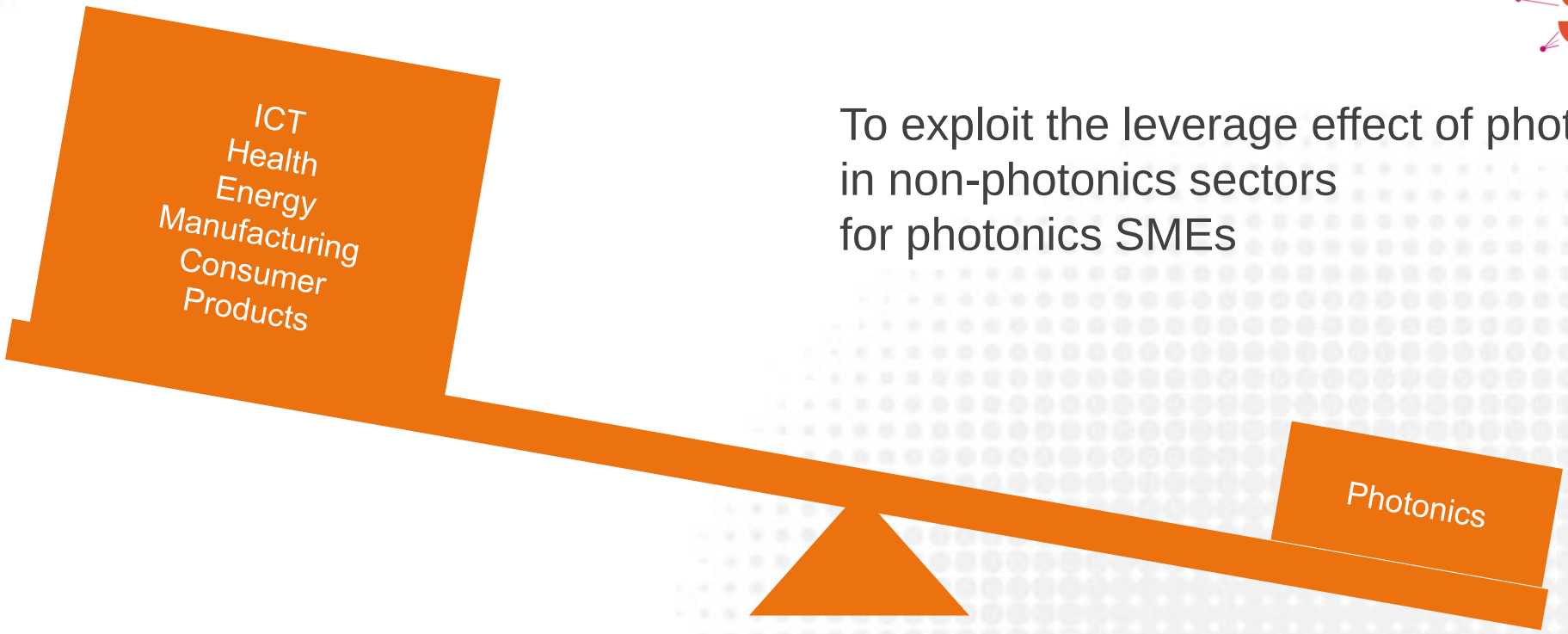
PHOTONICS PUBLIC PRIVATE PARTNERSHIP

Our Mission



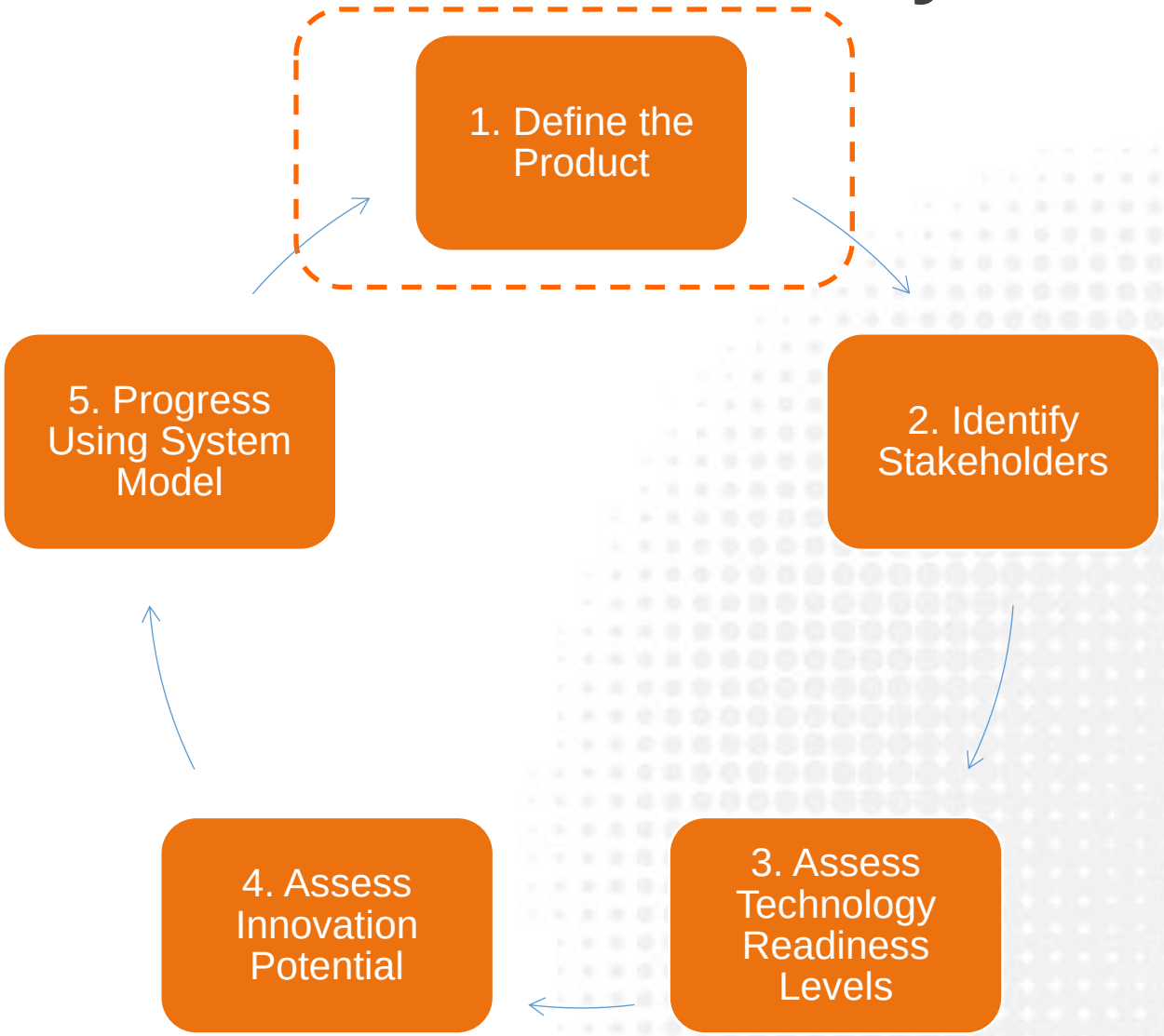
To exploit the leverage effect of photonics
in non-photonics sectors
for photonics SMEs

- Developing photonics for non-photonics sectors
  - How do photonics SMEs get to know the non-photonics field of application ?
  - What is the value of the photonics concept in the non-photonics field of application ?
  - Where should future R&D activities be directed by the non-photonics SME ?
  - What is the innovative potential for photonics in the enabled application field?

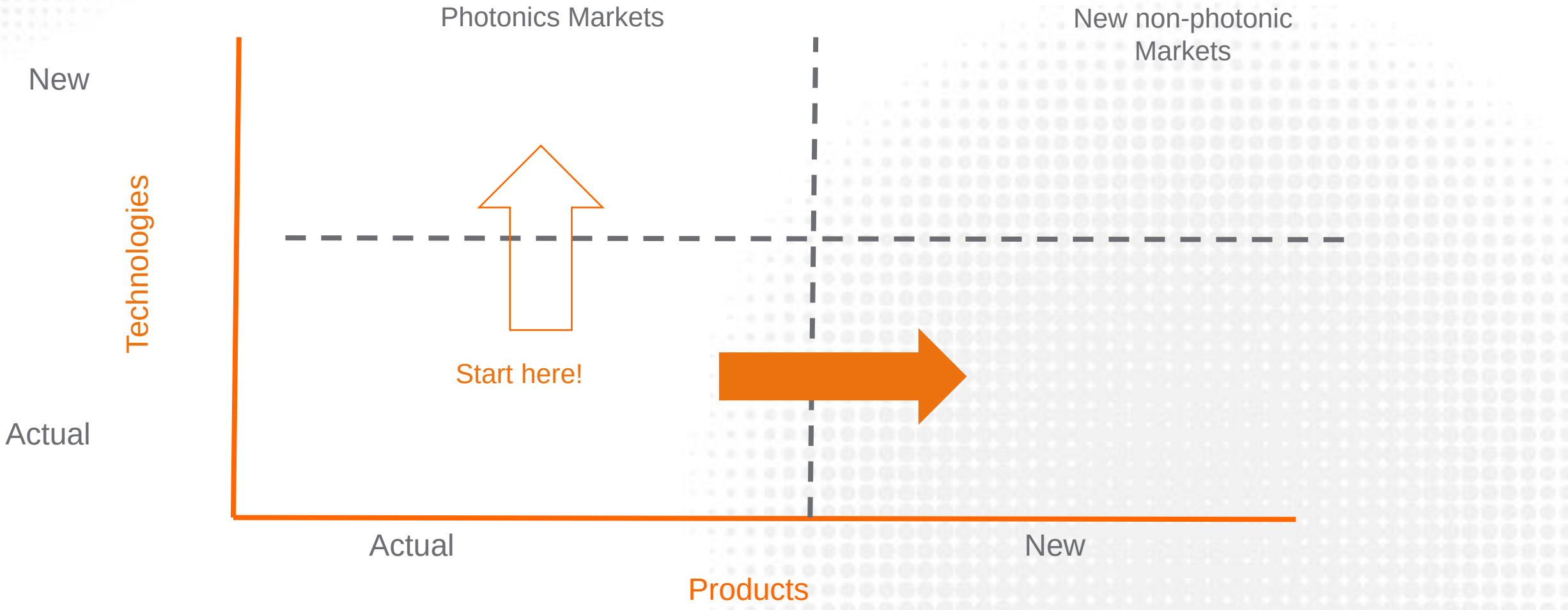
Our Vision

- The analysis of the value chain provides answers
  - Approach is centred on evaluating value propositions
  - Value chain analysis identifies collaborative and competing stakeholders.
  - Differentiated value chains are most competitive.
  - Gaps in value chains are weaknesses or threats.
- A well integrated system model optimises impact
  - Scalable innovation depends on well synthesised systems
- Value chain analysis informs subsequent market feasibility studies

Overview: Value Chain Analysis

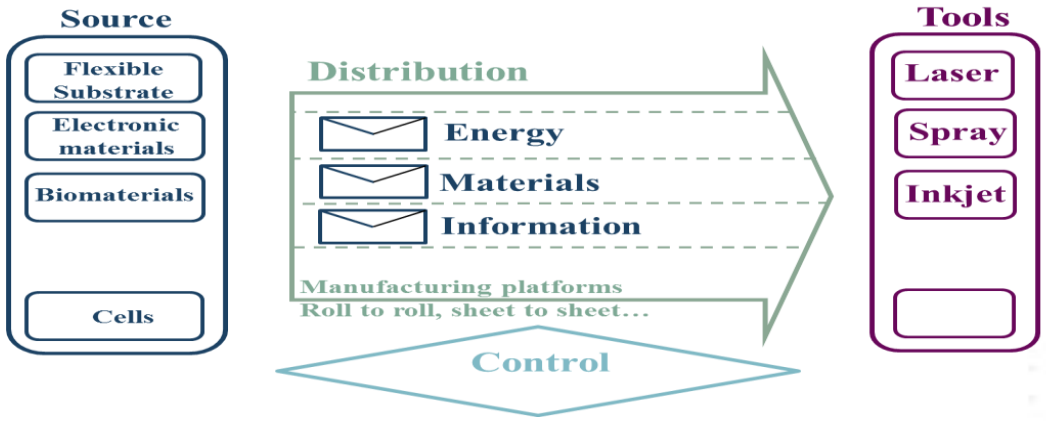


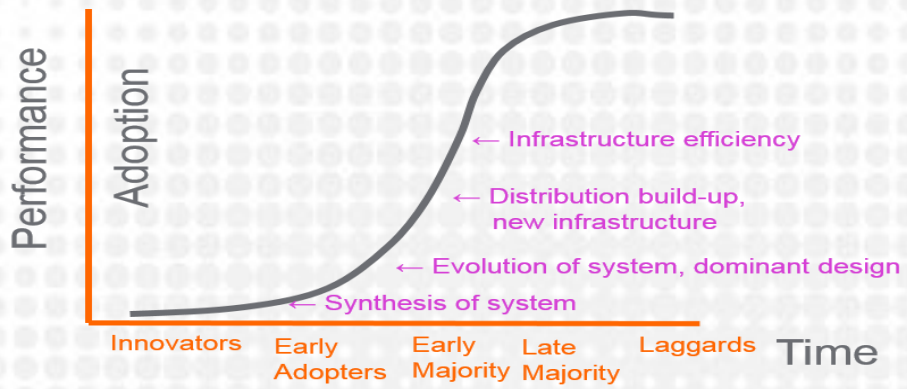
1.1 What is the future product ?



1.2 Define a system model[1]

For future scalable innovation

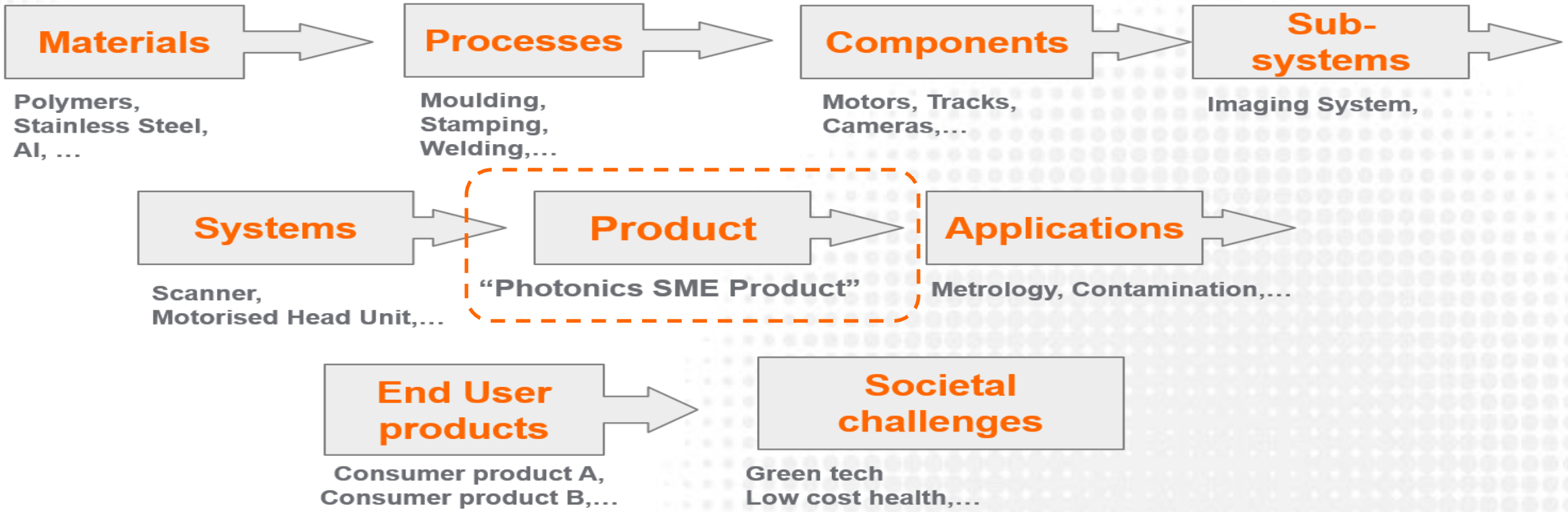




Reference

[1] Scalable Innovation, Shteyn & Shtein, CRC Press

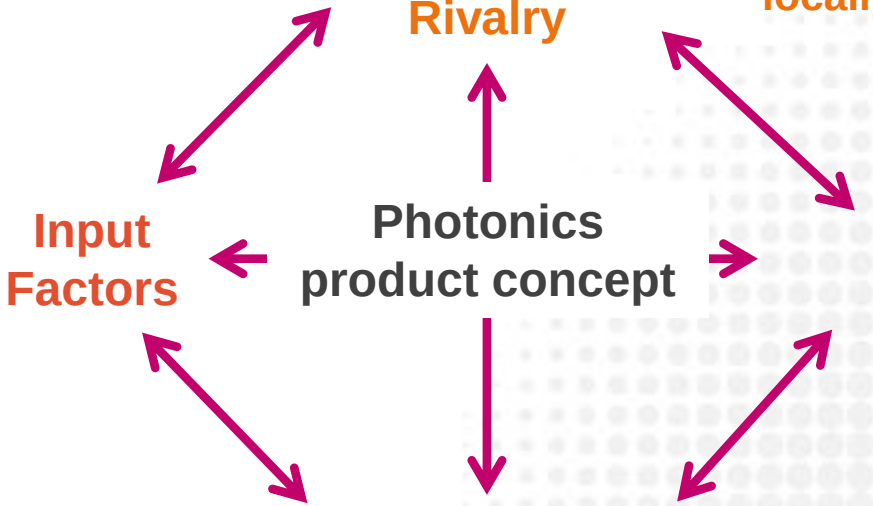
1.3 Know the technical value chain



Sources of technical value in an enterprise

The value chain is centred on the photonics product

1.4 Align with regional ecosystems



1. Local resource quantity & cost
    1. Natural
    2. Human
    3. Capital
2. Infrastructure
    1. Physical
    2. Administrative
    3. Information
    4. Scientific Technological
3. Quality
4. Specialisation

1. A local context that encourages investment and sustained upgrading
2. Vigorous local competition among locally based rivals

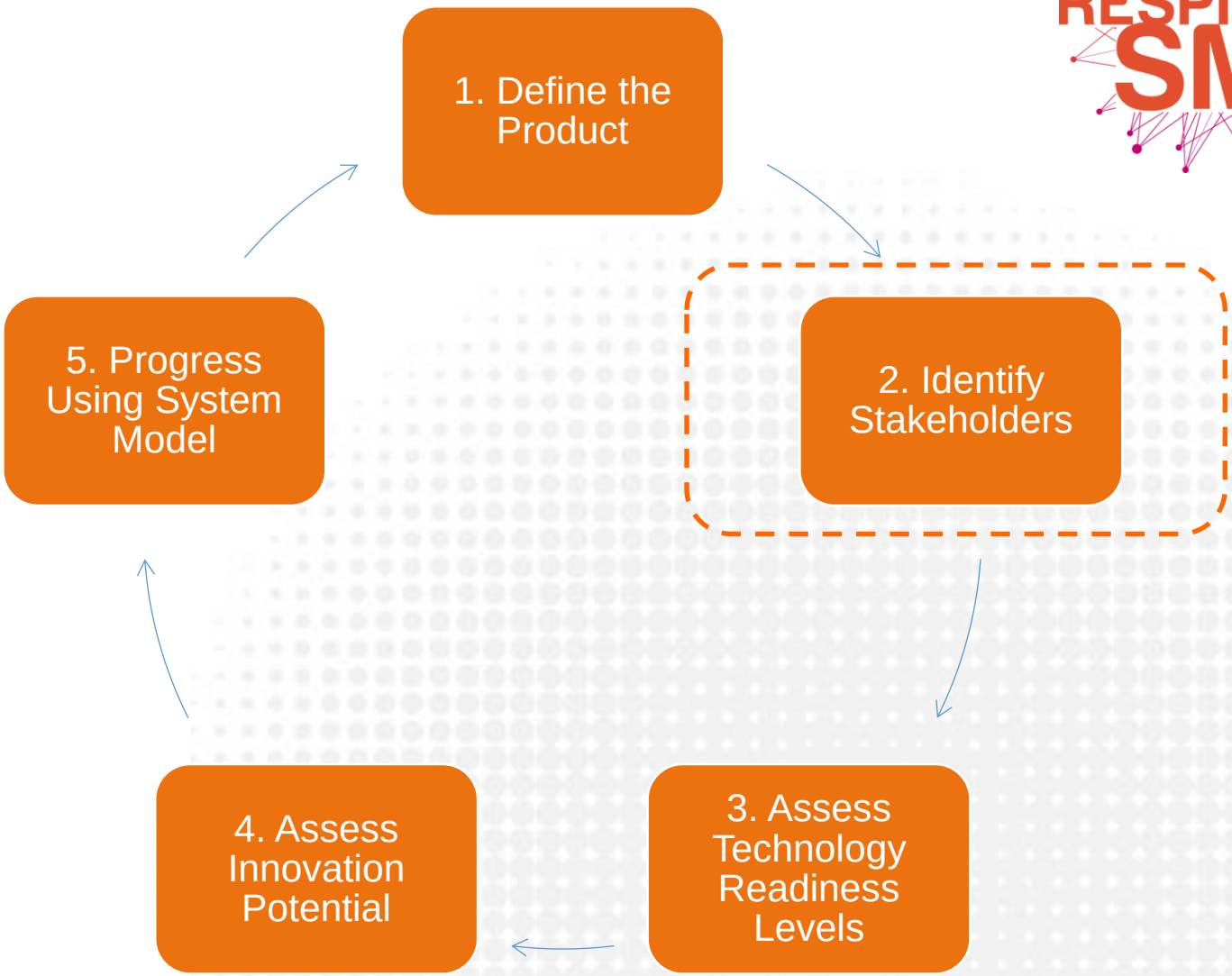
1. Sophisticated & demanding local customers
2. Local customer needs that anticipate global needs elsewhere
3. Unusual local specialised needs which are global

1. Presence of capable locally based suppliers
2. Presence of competitive related industries

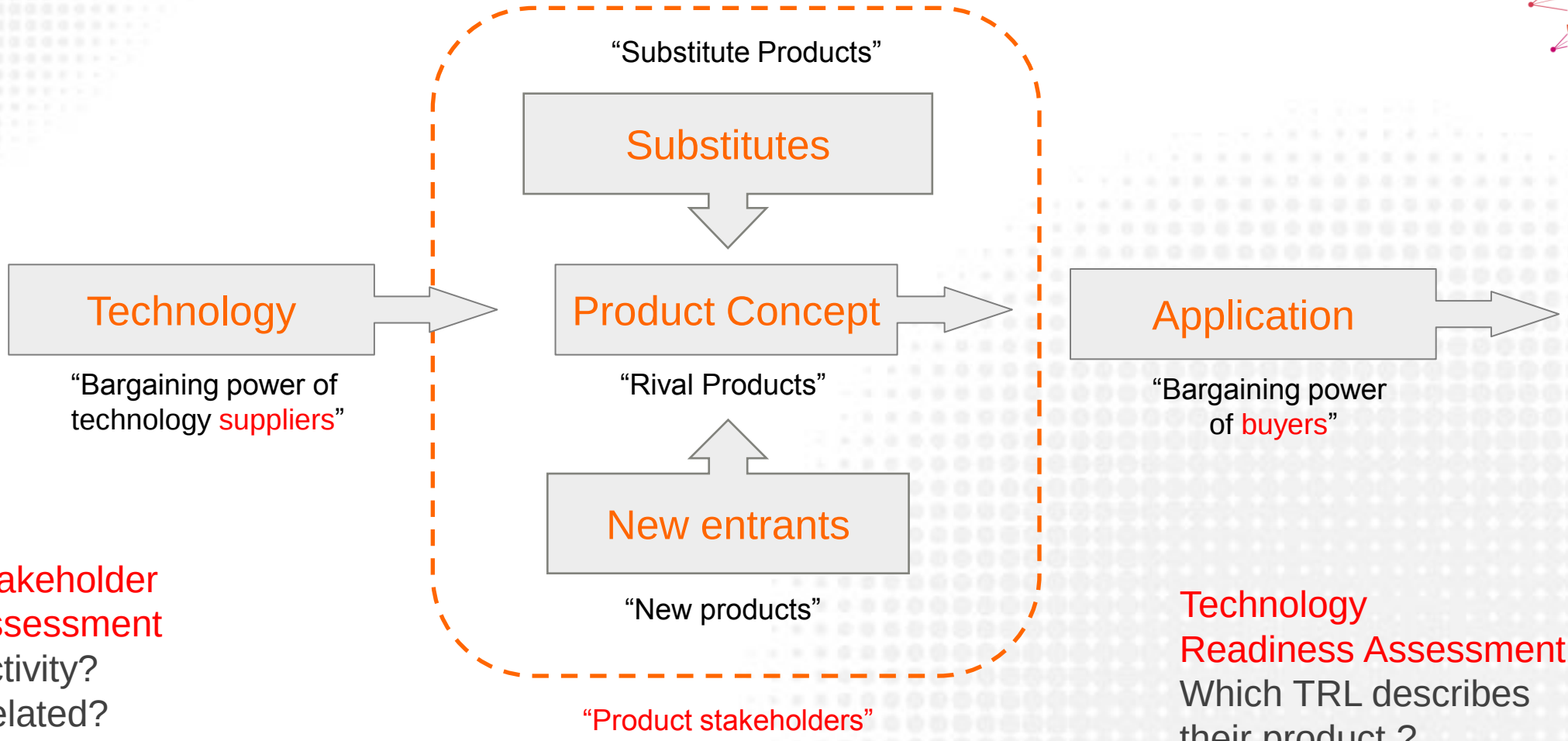
Reference

[2] On Competition, Porter, Harvard Business Review

2. Stakeholder Analysis



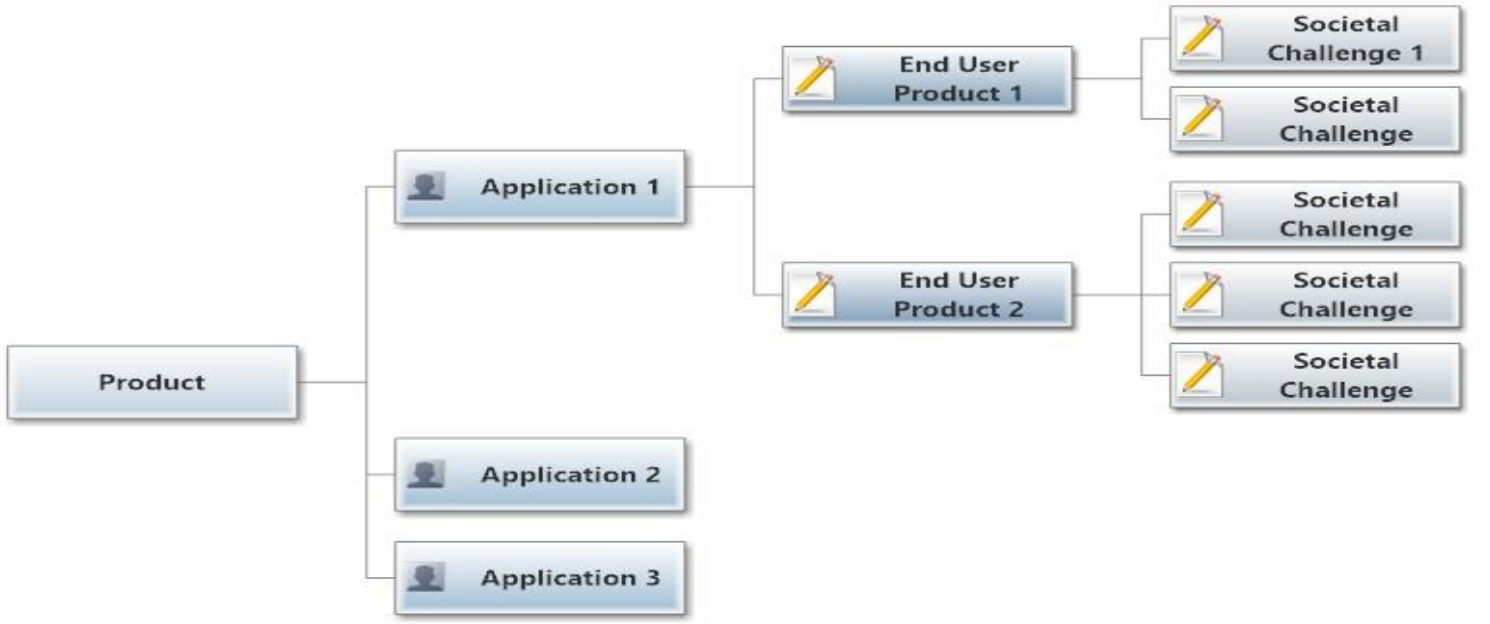
2.1 Identify stakeholder categories



Stakeholder Assessment
Activity?
Related?
Conflicted?
Engagable ?

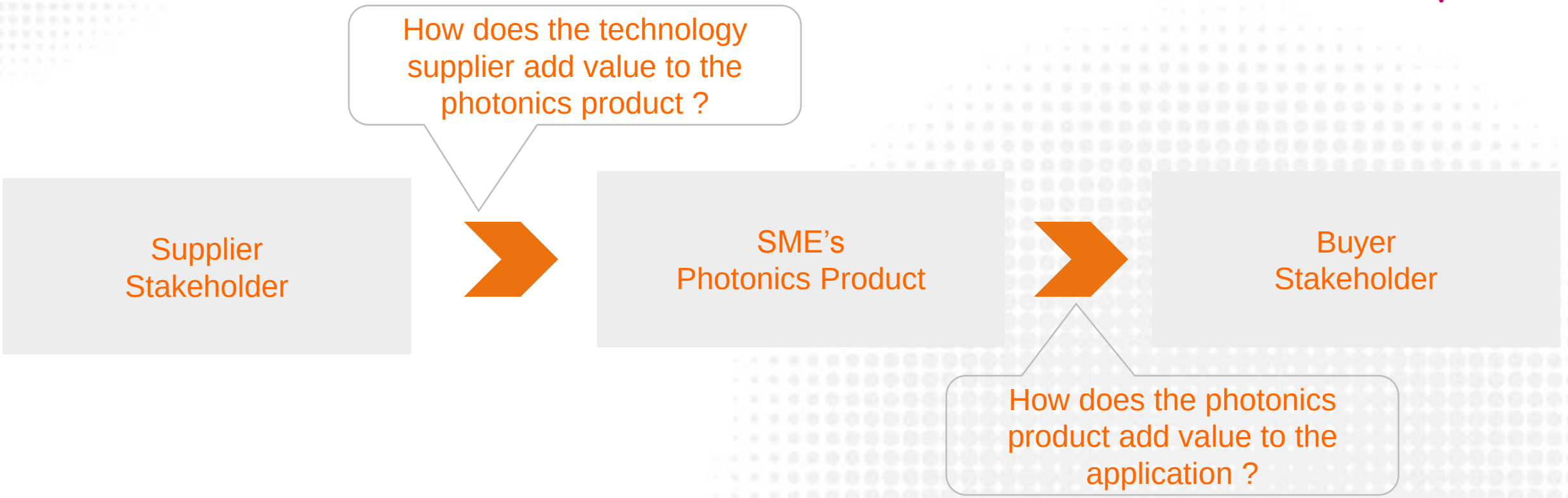
Technology Readiness Assessment
Which TRL describes their product ?

2.2. Find Stakeholders



- Structured, keyword-based, web search on specific websites only using custom search engines
- Clusters, RTOs, Education, ….

2.3 Identify the value proposition



The specific value proposition is core to stakeholder – stakeholder interactions

3. Technology Readiness Level

Motivation for TRL analysis

- Technology readiness levels
  - Identify risk
  - Identify & prioritise next research actions

- Conservative/strict assessment of TRL
- TRL assessed for technology implemented in photonics concept

- Aspire to:
  - High TRLs for technology supply side of value chain
  - Mid range TRLs for buyer side of value chain

3.1 Implement TRL assessment

Strict / conservative assessment

TRL	Definition	Description	Yes/No
9 – Proven	Actual system operated over full range, in final form.	No further development required / possible ?	
8 - Qualified	Actual system completed & qualified through test & demonstration.	End of true system development ? Who qualified and tested the system?	
7 – Demo operational environment	Full-scale, prototype system operated in relevant environment.	Actual prototype represents full scale system? Compare relevant to actual environment.	
6 – Demo in relevant environment	Pilot engineering scale system validated in relevant environment.	Is prototype beyond lab-scale? Does tested demonstrate high readiness?	
5 – Validated in relevant environment	Laboratory scale system, concept validated in relevant /simulated environment.	Are technology components integrated in high fidelity system that match final application in almost all respects ?	
4 – Validated in laboratory	Component & or system validation in simulated laboratory environment	Are basic components integrated in low fidelity system? Has ad-hoc testing been completed ?	
3 – Proof of concept	Analytical & experimental critical function shown in proof of concept.	Is active research & development initiated? Do preliminary results exist ?	
2 – Concept formulated	Technology concept formulated. No proof or analysis	Have basic principles been observed? Is speculative application identified ?	
1 – Basic principle observed	Principles observed & reported. Study of technologies basic properties.	Have ideas for translation of scientific research to applied R&D been completed ?	

4. Innovation Potential

4.1 Assess potential of value proposition

How does the technology supplier add value to the photonics product ?

How does the photonics product add value to the application ?

Supplier Stakeholder

Value proposition

SME's Photonics Product

Buyer Stakeholder

Innovation Potential Level	Definition	Description
9 –Transformative	Potential to redefine the market	Has the potential to be a market leading innovation that creates and defines a new category of product/service.
8 - Compelling	High potential for success	Has the potential to be a market leading innovation
7 – Empowering	A competitive innovation	Plays well to the strengths of the company, has a strong possibility of success.
6 – Advanced	Could be successful under the right conditions	A solid advancement that has some limitations in the technical field, the market field or both
5 – Has Potential	Worth pursuing but needs refinement	Could be a worthwhile effort if additional advancement can be made in the innovation potential
4 – Unresourceful	Makes poor use of resources	Requires significant development in both market and technical fields
3 - Risky	Low chance of success	Requires reconsideration of market and technical positioning
2 – Incomplete	Needs major development/reconsideration	Requires significant redevelopment of concept in both market and technical fields, therefore both risky and low potential
1 –Insufficient	Not currently Possible or worthwhile	Does not fulfill the basic criteria for success

4.2 Assess innovation potential

Semi-quantitative assessment on each specific value proposition –from the perspective each stakeholder.

	Technical	weighting (1,2,3)	(0,1,2)	Guide
Breakthrough	How much is the technology suddenly possible ?	3	2	0 - Not Sudden, 2 - Very Suddenly
Hard Barriers	To what extent are the essential physical demonstration resouces present?	1	2	0 - Not Present, 2 - Very Present
	To what extent are the essential implementation technologies present?	3	2	0 - Not Present, 2 - Very Present
Soft Barriers	To what extent does the development break recognised pre-existing trade offs?	3	2	0 - No Breakage, 2 - Significant Breakage
State of flow	Are the proposers in a state of "flow", using a high skill level to address a high challenge?	3	2	0 - Low Skill, High or Low Challenge, 2 - High Skill, High Challe
Intellectual Property	How well is the I.P dispersed across the system model?	3	2	0 - Not Well, 2 - Very Well
(System Model)	How well are the parts of the system model integrated?	3	1	0 - Not Well, 2 - Very Well
	What is the likelyhood of future congestion in the distribution channels?	3	1	0 - Likely, 2 -Unlikely
	How much scope exists for a "Paradigm Shift" in the infrastructure to address future congestion?	3	1	0 - No Scope, 2 - Scope
	What scope is there for ensuring the right packaged payload gets to the right source and the right tool in the evolved system model.	3	0	0 - No Scope, 2 - Scope
	How well does your intellectual capital compliment your Intellectual Property?	3	0	0 - Not Well, 2 - Very Well
S-Curve?	Where is the technology on the S-Curve?	3	2	0 - Start or Late, 2 - Rising Towards Middle
	Market	**weighting (1,2,3)**	**(0,1,2)**	**Guide**
Breakthrough	To what extent is the innovation desperately needed?	3	2	0 - Not Needed, 1- Desperately Needed by Select Few 2 - Despe
Hard Barriers	How accessible is the market that exists for the proposed development ?	3	2	0 - Not Accessible, 2 - Very Accessible
	How well does the development resonate with an opportunity rich environment?	3	2	0 - Does Not Resonate, 1- Resonates with unique Regional Env Environment Recognized Internationally
Soft Barriers	How readily available are a creative crowd of first adopters?	3	2	0 - Not Available, 2 - Available
	How accessible are markets of a multitude?	3	2	0 - Niche, 2 - Mass Market
Outside the box	How considerable is the potential impact on the wider system?	3	2	0 - Not Considerable, 2 - Considerable
Adopters	What motivates the purchase of the development ?	3	2	0 - What is does ?, 1 - How it works, 2 - Why it is important ?
	Innovation Potential		**8.0**	**Compelling**

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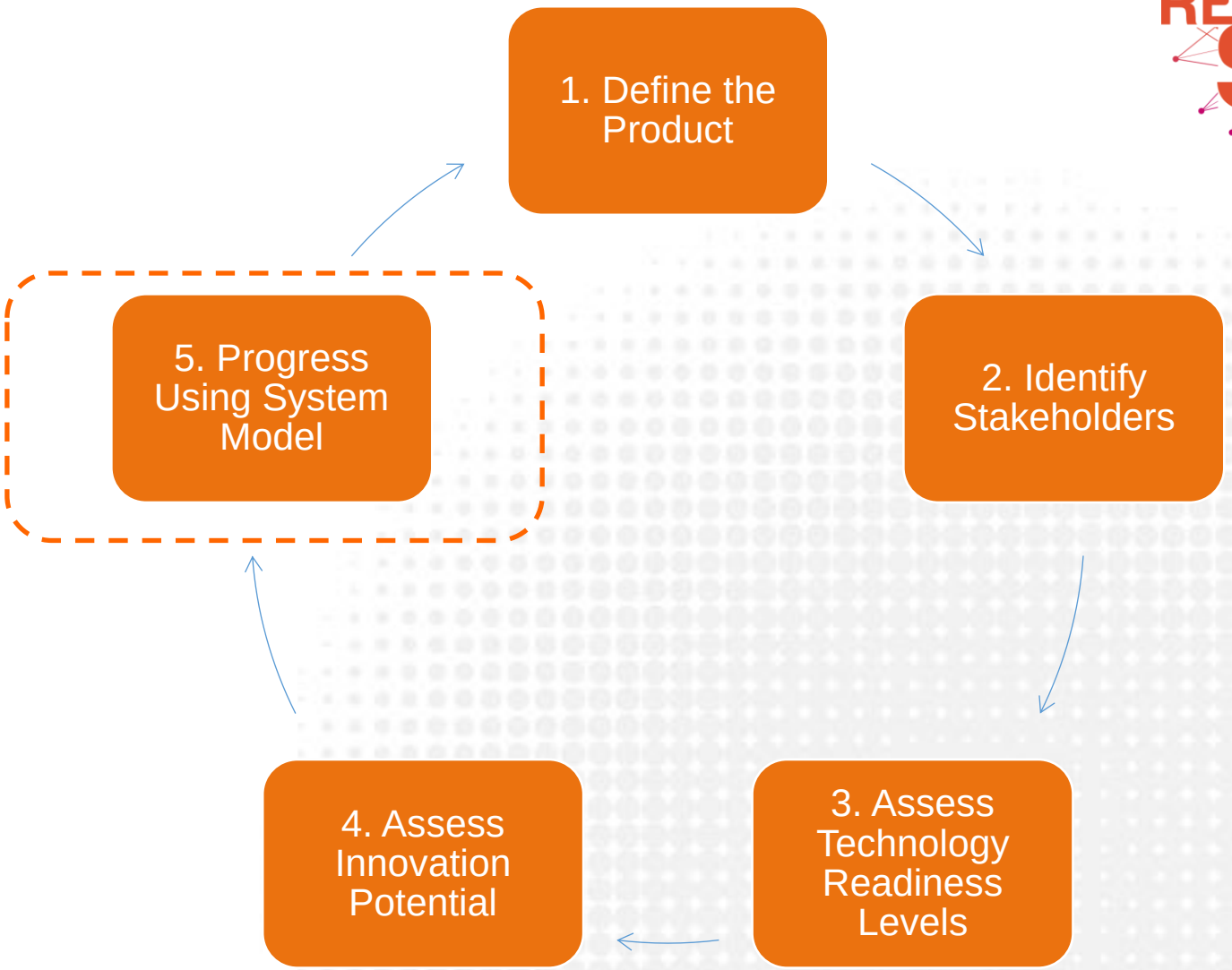
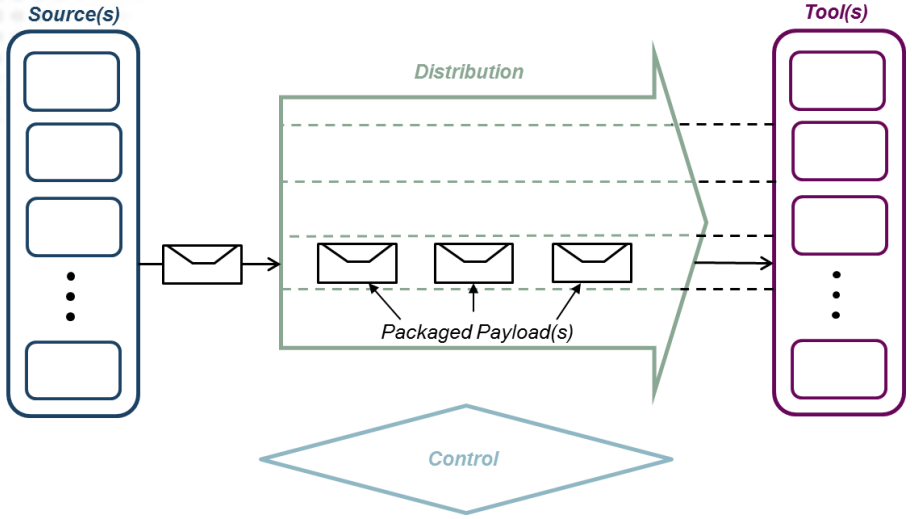
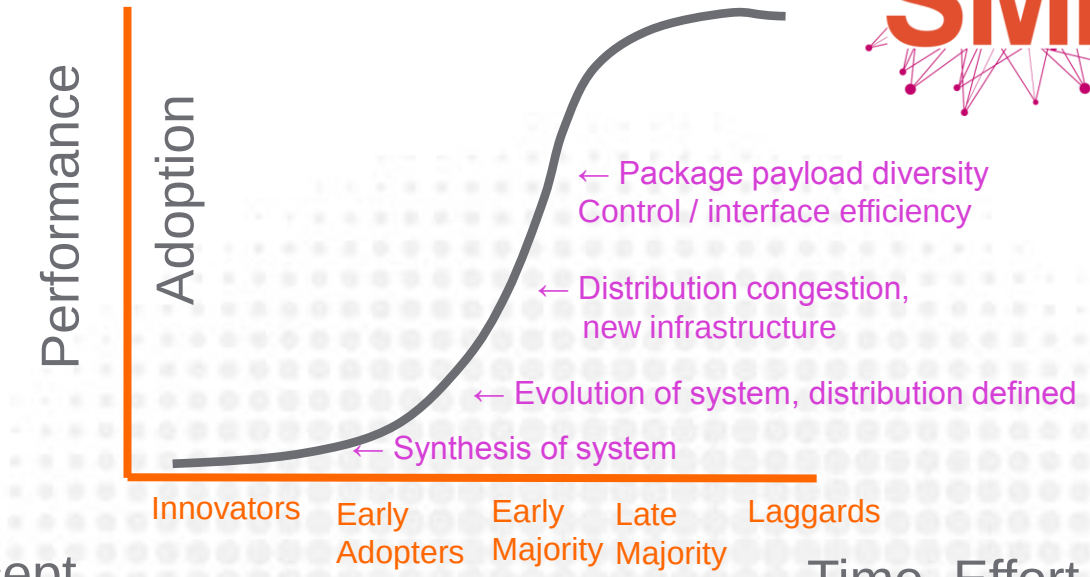
5. System model



5.1 Align stakeholders (IP >6) with system model components



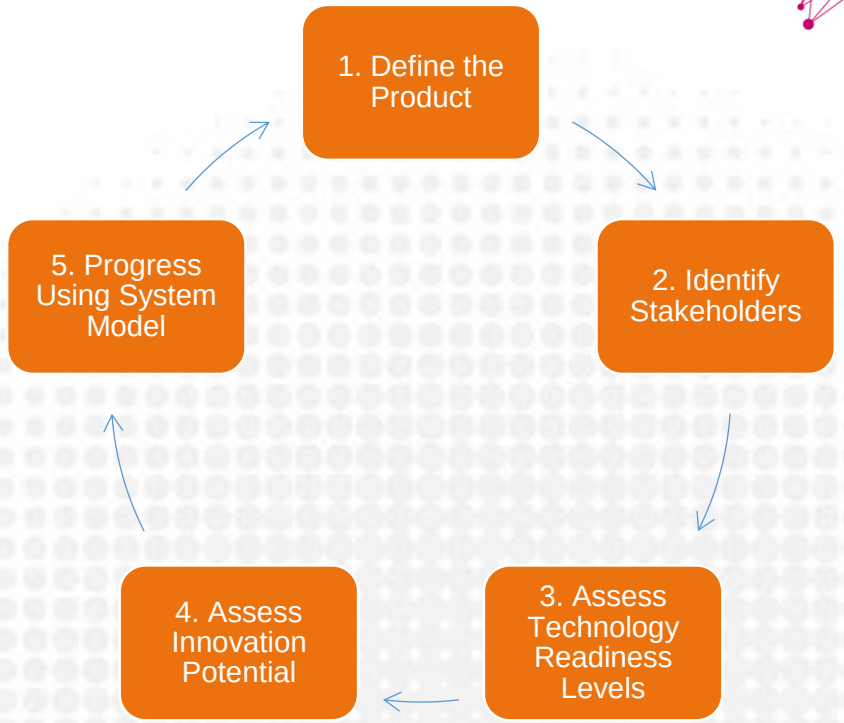


- Tool –the key functionality of the product concept
- Source –the source of materials, energy, information used by product
- Distribution –the channels by which sources are delivered to tool.
- Package payloads –discrete packets of materials, energy & information
- Control –orchestrates interactions between elements in the product
- Interfaces –integral to system connectivity and product completeness

Summary Outcomes:

Developing photonics for non-photonics sectors

- How do photonics SMEs get to know the non-photonics field of application ?
  - Iterative application of the Value Chain Analysis tool
  - Photonics SME challenged by tasks in tool.
- What is the value of the photonics concept in the non-photonics field of application ?
  - Focus on value proposition and value chain analyses
- Where should future R&D activities be directed by the non-photonics SME ?
  - Gaps / raising the TRL of weaknesses in value chain
  - Better integration of product concept in system model.
- What is the innovative potential for photonics in the enabled application field?
  - Innovation potential defined for value propositions
  - Integration of stakeholders in system model



- Implementation:
  - Initial pilot test completed with Irish micro-enterprise
  - Manufacturing demonstration underway with UK SME.
  - Transport/environment/energy to follow.