

SFERA-III

Solar Facilities for the European Research Area



“The Role of Business Models and SSH in Helping Solar Technologies Succeed”

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Summer School: “Smart CSP: How Smart Tools, Devices, and Software can help improve the Design and Operation of Concentrating Solar Power Technologies” - WP1 Capacity building and training activities - Cologne, Germany, September 14th-15th 2023



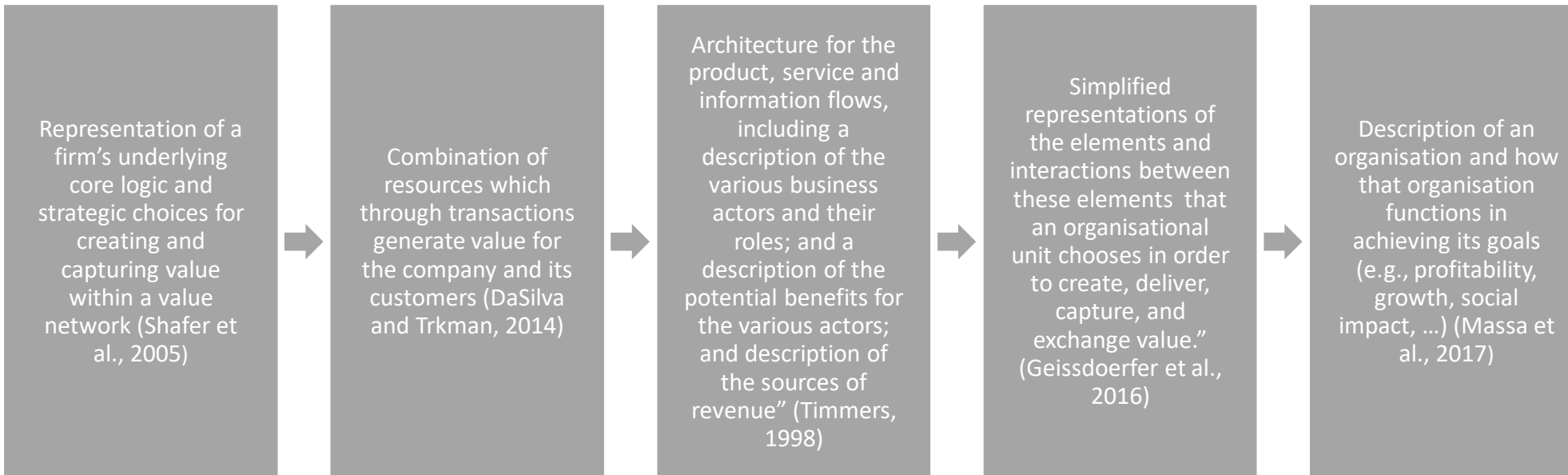
THIS PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT NO **823802**

Aim of the Talk

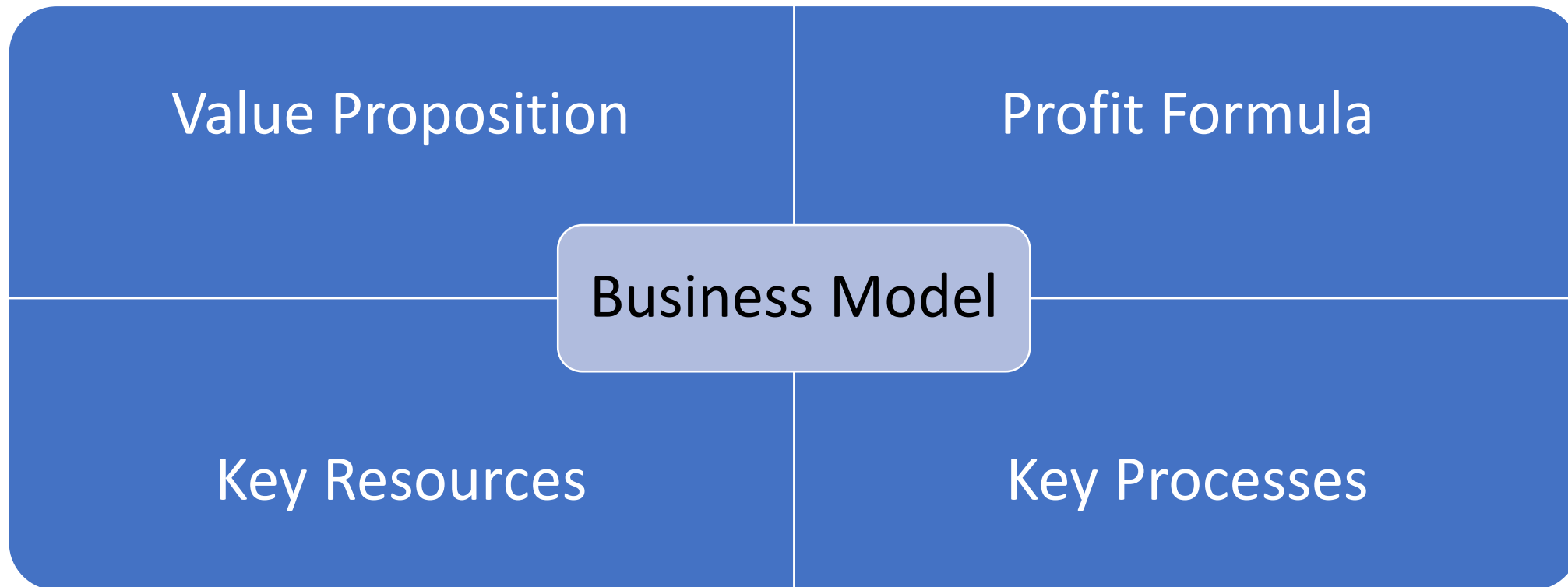
- Not really to teach you the Business Models or Green Business Plans and how to make them
- Not to teach you the importance of SSH in technological innovation
- But to have an idea about the business models and SSH concerns so that you can start your technologically innovative research keeping them in mind.
- Need for engineers that can think like social scientists and social scientists that can think like engineers. First one is way easier.



What is a Business Model?



Commonalities in Definitions



Value Proposition



Description of how the business help customers get the job done and the problem solved.



More important the job or harder the problem is, greater the value proposition.



Thorough understanding of the job and the customer problem is key to offer value proposition.

How can Business Models Help Solar Technologies?

The Value Proposition

- What is the underlying Value Proposition of the solar technology?
 - What customer needs are targeted?
 - Does the technology help ease a job or solve an existing problem?
 - In what technical aspects the novel technology exceeds the conventional one?
 - How do customers perceive and weigh the financial burden and technical advantages of the novel technology?

Profit Formula

- Explains how business create value for itself while meeting the customer value proposition.
- Selling prices and costs are taken into account.
- Prices are tied to the Value Proposition
- Costs are tied to the Key Resources and Processes



How can Business Models Help Solar Technologies?

The Profit Formula

- Is the solar technology feasible/profitable?
 - What are the sunk, and variable costs of producing the technology?
 - What costs are associated to necessary inputs?
 - At what profit margin the technology should be sold in order to continue production?
 - Considering the price of competing technologies, what is the price range within which the novel tech. could sell?
 - What is the projected demand according to different pricing?
 - What is the paybacktime of investment into the novel technology, given demand projections?

Key Resources

- Assets and their interaction that create value for the customer and the company.
- E.g. Employees, Equipment, Technology, Information, Channels
- Can be regarded as all kinds of key inputs to produce a good or service of value.



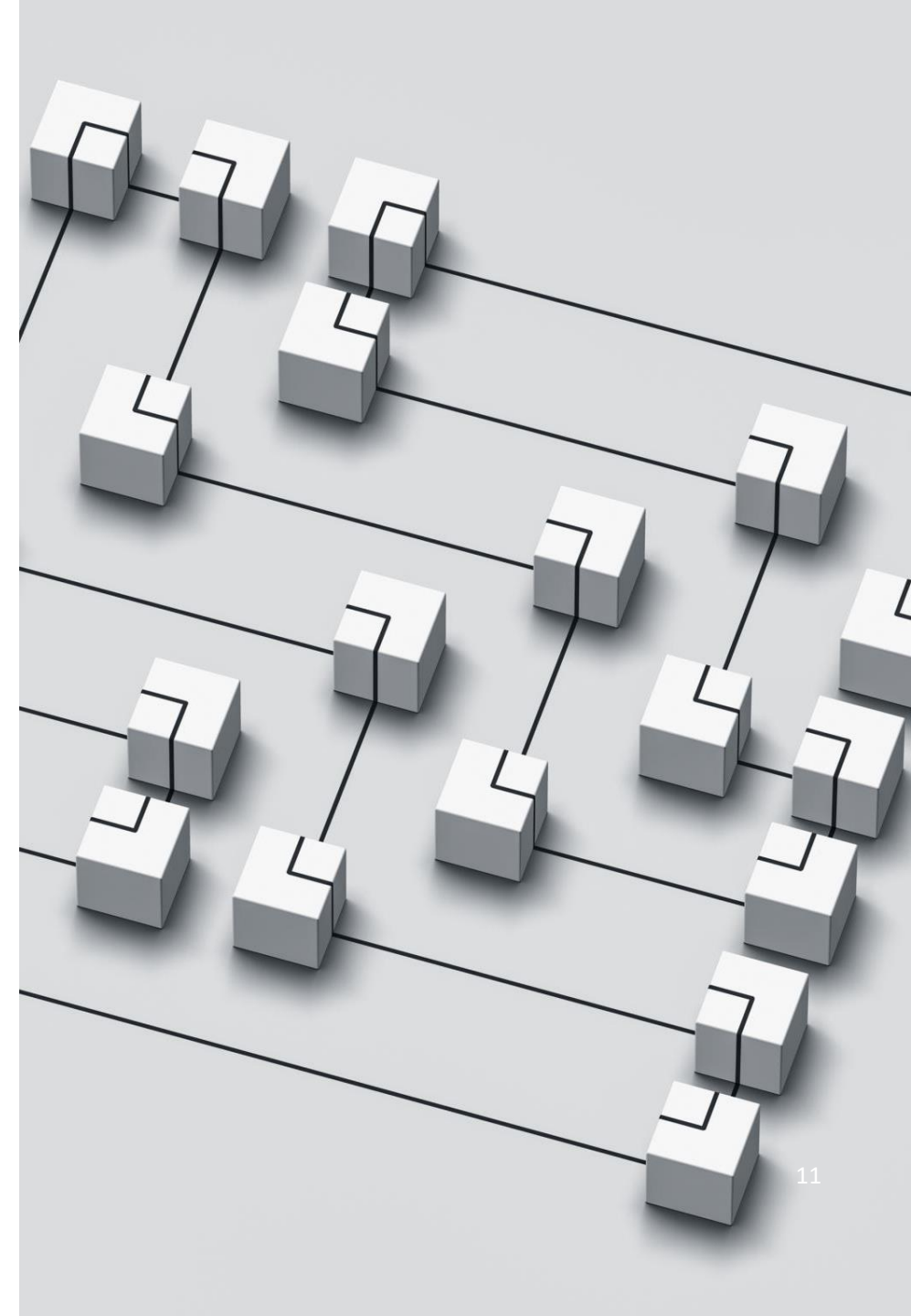
How can Business Models Help Solar Technologies?

The Key Resources

- Who are the key people in R&D, planning and organization, sales etc.?
- What are the key inputs and equipment to produce the technology?
- What are the key channels to reach both the resources and to the end customers?
- Who are the key partners/institutions/brands that can help develop the tech. and enhance the acquisition of resources and enhancement of customer base?

Key Processes

- Processes, rules, metrics and norms that ensure repeatable and scalable value delivery.
- E.g. Design, product development, manufacturing, training (Process)
- Credit terms, supplier terms, margin requirement for investment (Rules and Metrics)
- How to approach customers and channels (Norms)



How can Business Models Help Solar Technologies?

The Key Processes

- What are the main processes starting from acquisition of resources to the end customers? E.g. Procurement, design, manufacturing, hiring, outsourcing, marketing etc.
- What should be the rules and norms in these processes? E.g. Priorities in design, precision in manufacturing, approach behavior to customers and channels in marketing.
- Does processes carry any risks of failure? E.g import restrictions in acquisition of inputs, price volatilities in marketing, malfunctioning in manufacturing

Interaction of Business Model Elements

Adapted from Jhonson et al., 2008

Customer Value Proposition (CVP)

- **Target customer**
- **Job to be done** to solve an important problem or fulfill an important need for the target customer
- **Offering**, which satisfies the problem or fulfills the need. This is defined not only by what is sold but also by how it's sold.

PROFIT FORMULA

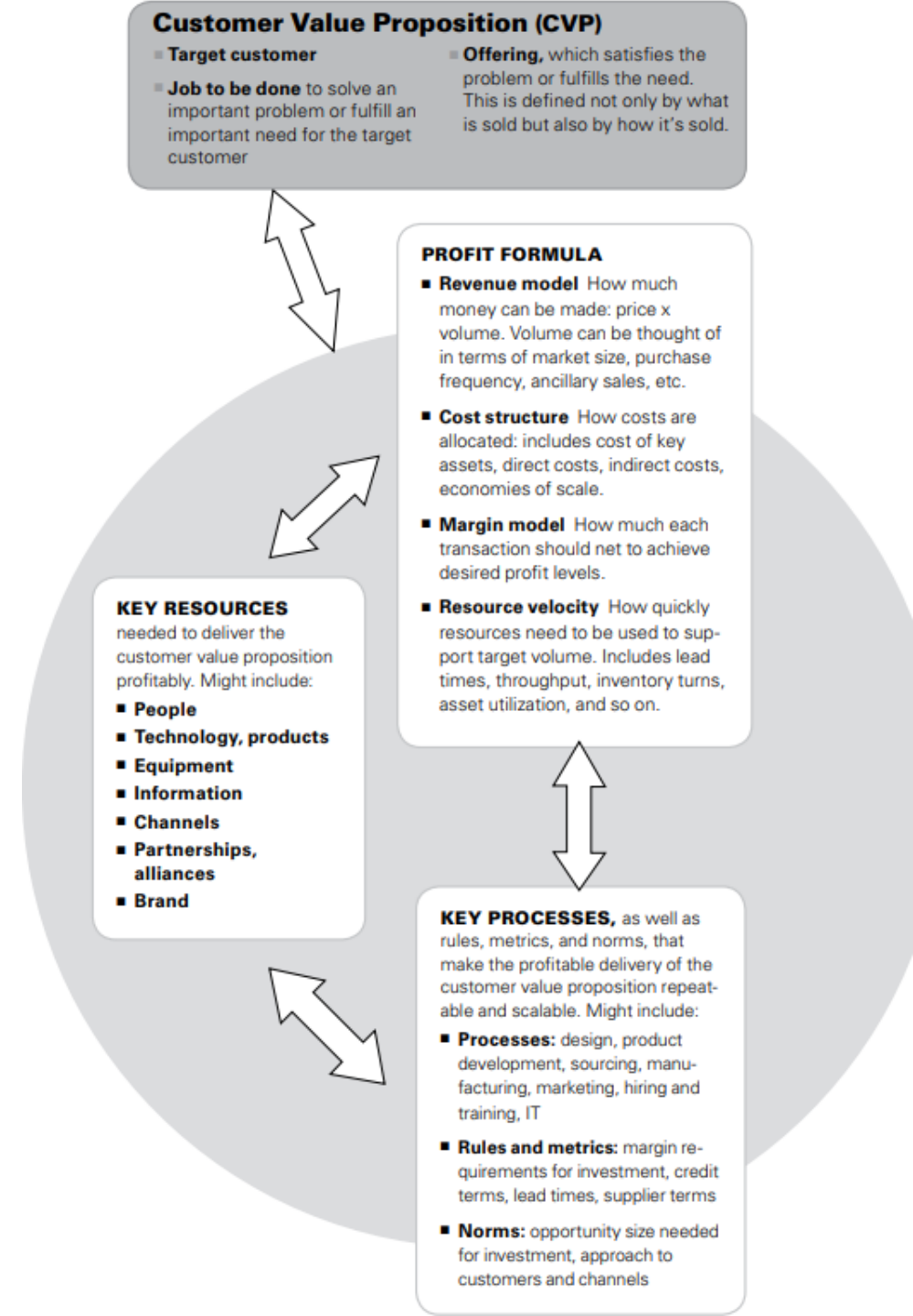
- **Revenue model** How much money can be made: price x volume. Volume can be thought of in terms of market size, purchase frequency, ancillary sales, etc.
- **Cost structure** How costs are allocated: includes cost of key assets, direct costs, indirect costs, economies of scale.
- **Margin model** How much each transaction should net to achieve desired profit levels.
- **Resource velocity** How quickly resources need to be used to support target volume. Includes lead times, throughput, inventory turns, asset utilization, and so on.

KEY RESOURCES
needed to deliver the customer value proposition profitably. Might include:

- **People**
- **Technology, products**
- **Equipment**
- **Information**
- **Channels**
- **Partnerships, alliances**
- **Brand**

KEY PROCESSES, as well as rules, metrics, and norms, that make the profitable delivery of the customer value proposition repeatable and scalable. Might include:

- **Processes:** design, product development, sourcing, manufacturing, marketing, hiring and training, IT
- **Rules and metrics:** margin requirements for investment, credit terms, lead times, supplier terms
- **Norms:** opportunity size needed for investment, approach to customers and channels



SolarHub Project



- SolarHub is a Horizon Europe Project initiated by lead partners in Türkiye and Greece.
- Aim is to strengthen connections between and scale-up Greek and Turkish solar energy innovation ecosystems as a single, hybrid, cross-border, and interconnected Solar Energy Excellence Hub with an emphasis on agriculture applications.
- SolarHub includes development of novel solar technologies based on four pre-designs:
 - 1. Solar thermal solution for low-temperature heat applications
 - 2. Solar-aided hydrothermal treatment solution for agri-food residual products
 - 3. PV solution for power production and micro-climate creation for tree plants
 - 4. PV solution for efficient crop production through light and water management



1. Objective

Synergistically transform Greece and Turkey's 5 solar energy innovation hubs to accelerate realization of National and European Green Deal aligned energy, food, economic, social and environmental priorities.



6. Impacts

Transformed Greek and Turkish solar energy innovation hubs with enhanced Strategies, Capacities, and Activities to co-create solutions that support key EU and national Green Deal aligned priorities:

- T1.2 Joint R&I Strategies
- T2.3 Green Economic Growth
- T3.1-T3.4 Joint R&I activities leading to 4 "Pre-Designs".



2. Four Core WPs aligned with call's 5 Core Components

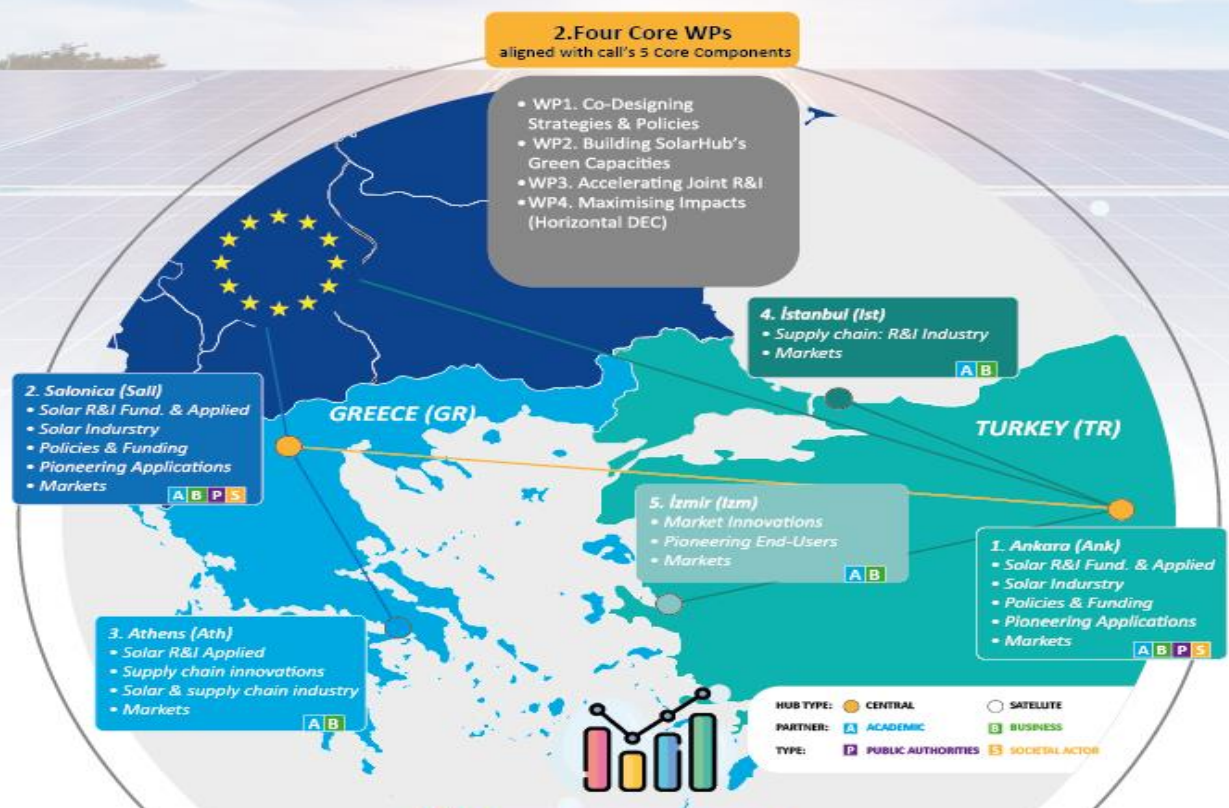
- WP1. Co-Designing Strategies & Policies
- WP2. Building SolarHub's Green Capacities
- WP3. Accelerating Joint R&I
- WP4. Maximising Impacts (Horizontal DEC)



3. Four "Innovation Support" Tasks

Targeting all key stakeholders in all hubs.

- T1.1 Hub Strategies
- T1.3 Green Energy Policies & Investment Action Plans
- T2.1 Green competencies & skills
- T2.2 Accelerating Green Innovation.



5. Outcomes

- Synergistic Hub Strategies, Capacities, & Activities;
- National policies & funding aligned with EU & national strategies & priorities;
- Enhanced capacities for holistic green innovation;
- 4 Open Pre-Designs to support replication.



4. Six "R&I Framework Solution" Tasks

Nurturing the creation of green solar energy solutions that respond to industrial and societal needs

- T1.2 Joint R&I Strategies
- T2.3 Green Economic Growth
- T3.1-T3.4 Joint R&I activities leading to 4 "Pre-Designs".

Consortium



What is a Business Plan?

A business plan is a comprehensive document that outlines the goals, strategies, and operational details of a business. It serves as a roadmap for entrepreneurs, providing a clear understanding of the business concept, its market, and the steps required to achieve success. It usually includes the following items:

- **Business Description:**
Detailed information about the business, including its legal structure, location, and history. It explains the products or services offered and the unique value proposition of the business.
- **Market Analysis:**
A thorough analysis of the target market, industry trends, and competitors.
- **Organization and Management:**
Details about the organizational structure, management team, and key personnel.
- **Product or Service Line:**
Description of the products or services offered, their features, and how they meet customer needs.
- **Marketing and Sales Strategy:**
The strategies and tactics to reach and attract the target market. Pricing, distribution channels, promotional activities, and sales forecasts.
- **Financial Projections:**
A detailed analysis of the financial aspects of the business.
- **Funding Request**
- **Operations and Management Plan**
- **Risk Assessment and Mitigation**

What is a Green Business Plan?

A green business plan, also known as a sustainable business plan or an eco-friendly business plan, focuses on integrating environmental sustainability and social responsibility principles into the core operations of a business.

It outlines strategies and actions that a company will undertake to minimize its environmental impact, reduce resource consumption, and contribute positively to society.

It has a triple-bottom-line approach: measuring success according to impact on people, impacts on planet and generation of profit.

A green business plan should show that a project is economically viable, environmentally sound and socially just.

Green Business Plan Outline

Technical... Technical summaries of Solar Pre-designs (made by the help of technical WPs)

Economic... What do potential customers want? What are their problems? Do they care about solutions suggested by Solarhub? What are they currently doing without these solutions? What are the possible funding options for the business uptake in Türkiye and Greece? (bootstrapping, business loans, government loans, crowdfunding, incubators, venture capital funds, etc.)

Social... Who are the customers or users we are targeting? They could be buyers or producers, or govt. Who else is going to be affected by these projects? Are there other stakeholders? Do the customers care about the green aspect, are they willing to pay extra, and will the government need to subsidize? Are there social acceptance perception and issues on Solarhub pre-designs? Is there any difference between different social groups (according to age, gender, etc.) in terms of perception and acceptance? What could be done to improve them? What are the overall social outcomes for the society and what are the potential impacts on vulnerable groups (women, children, elderly, disabled, poor, immigrants, and intersection groups)

Business Plan Outline

Environmental... What additional eco-social costs and benefits are expected? Does this affect the regular cost/benefit calculations and results? Life cycle assessment will be used as an evaluation method.

To conduct LCA, for each pre-design:

System boundaries and functional unit should be clearly defined.

The process flowcharts should be drawn.

Inventory analysis should be conducted (Quantifying inputs (energy, water, material) and outputs (products, emissions and solid wastes))

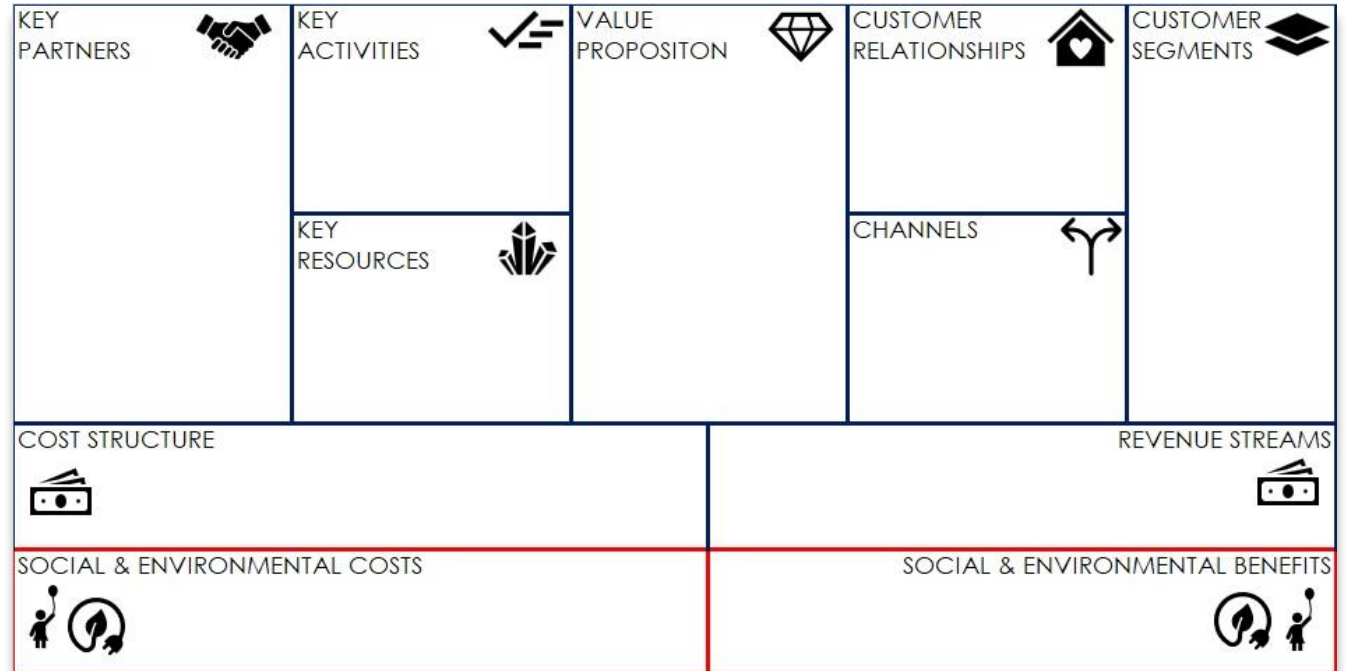
Potential environmental impacts will be evaluated considering different impact categories such as global warming potential, acidification potential, eutrophication potential, resource depletion, and human toxicity.

Allocation strategy should be discussed to decide how to distribute the impacts among different co-products (i.e., energy and crop).

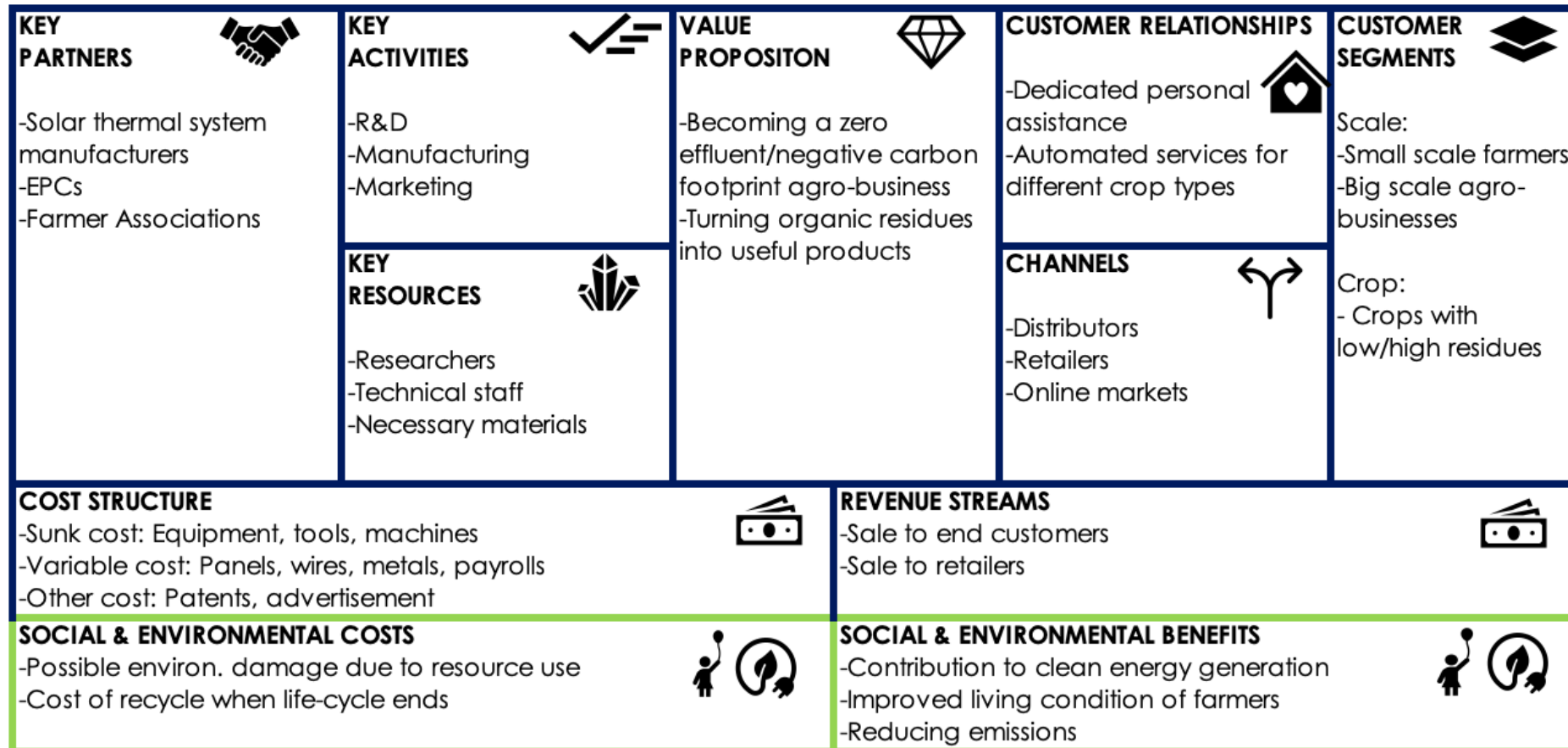
These steps should be conducted in harmony with each pre-design team.

How SolarHub Benefits from Business Models?

- We use Sustainable Business Model Canvas - an extended version of Business Model Canvas originally developed by Alexander Osterwalder and Yves Pigneur.
- To understand the solar technology at a glance as if they are to be marketed as business projects.



Example Business Model for Pre-design 2: Solar-aided hydrothermal treatment solution for agri-food residual products



-Economic Aspects:

- Economic Conditions can motivate engineering innovations
- Technoeconomic Analysis/
LCOE,IRR,Capex, NPV
- Economic impact Analysis

- Social Aspects

- Social Acceptance
- Motivation for Policy changes
- Shareholder analysis
- Interviews with shareholders

Environmental Impacts

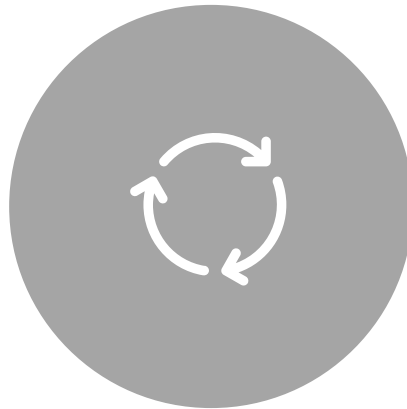
- Life Cycle Assessments (LCA)
- Impact on CO₂ emissions
- Circular economy solutions

SOCIO-ECONOMIC & ENVIROMENTAL IMPACT ASSESMENTS

Economic IMPACT ASSESMENTS



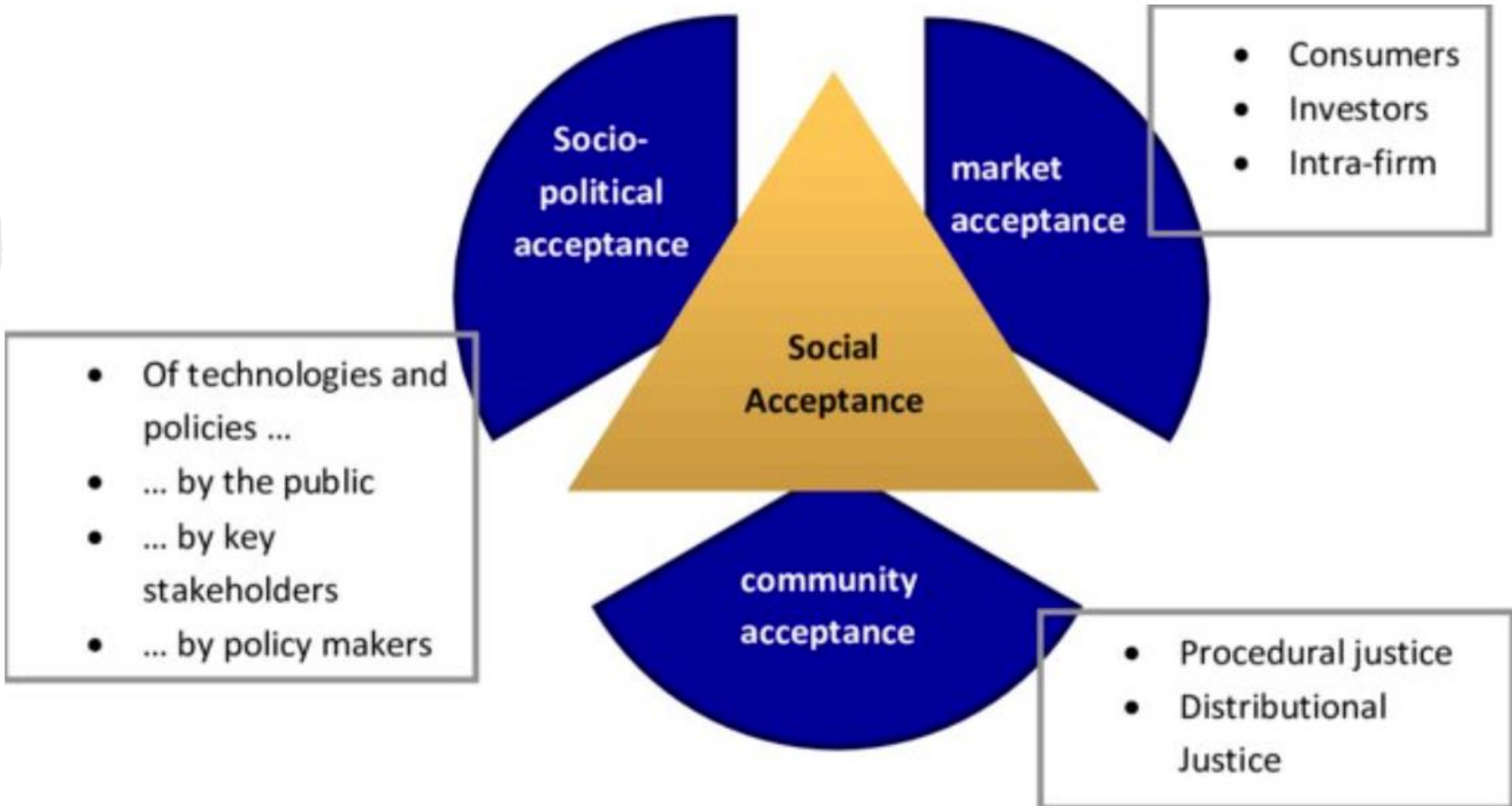
USING ECONOMETRIC TECHNIQUES



**USING MATLAB/JULIA/FORTRAN GENERAL
EQUILIBRIUM MODEL SIMULATIONS/
INTEGRATED ASSESMENT MODELS**

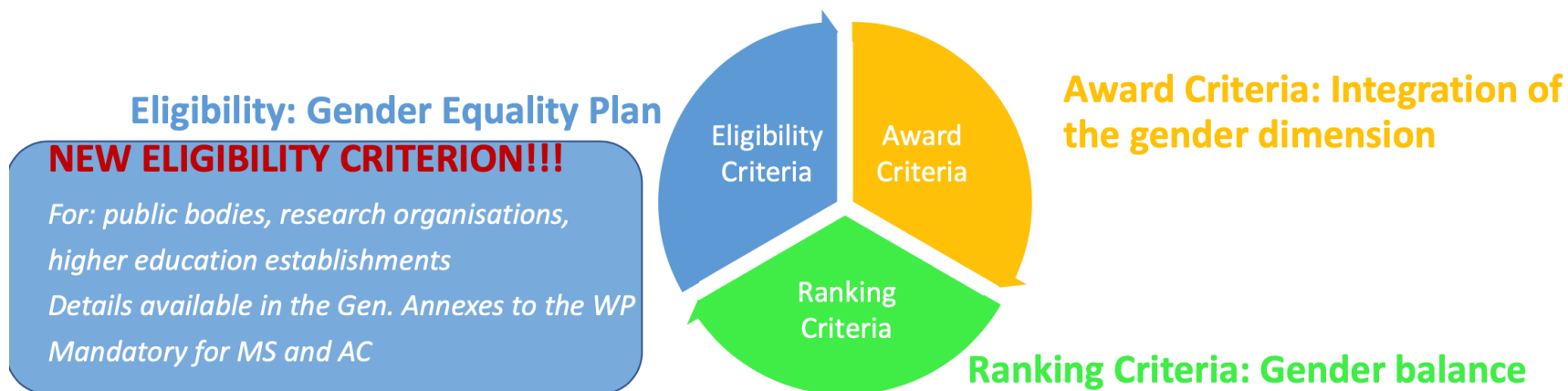


USING INPUT AND OUTPUT ANALYSIS



Gender Equality

- Gender equality is when people of all genders have equal rights, responsibilities and opportunities. Everyone is affected by gender inequality - women, men, trans and gender diverse people, children and families.
- Horizon Europe



Gender equality

Eligibility: Gender Equality Plan

Mandatory requirements!!!

- \\ **What is a GEP?**
- \\ **Public Document** signed by the top management, published on the institution website (not only on the intranet!), acknowledged and distributed within the institution (→ to demonstrate the commitment to equality including clear goals and which actions will be done to achieve them)
- \\ **Allocate resources..** For funding gender equality positions or teams (e.g., gender equality officers) & reserved time for others to work on gender equality
- \\ Based on **data collection and monitoring** (e.g., GEP based on disaggregated data on gender and sex collected across all staff categories within the institution)
- \\ Supported by **training and capacity building** (gender competence development, tackling unconscious gender bias of staff and decision makers)

Gender equality

Eligibility: Gender Equality Plan

Recommended requirements!!!

\\ **Recommended areas to include in the GEP** identified with experts and stakeholders:

- \\ **Work-life balance and organizational culture**
- \\ **Gender balance in leadership and decision-making**
- \\ **Gender equality in recruitment and career progression**
- \\ **Integrating the gender dimension into research and teaching content**
- \\ **Measures against gender-based violence, including sexual harassment**



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THANK YOU!