

Architecting a complex world

Systems Architecting Approach for Complex Ecosystems

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CESAMES at a glance

Issued from :



Top 1st French Engineering School established in 1794

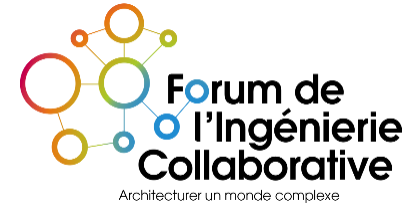


1st European Professional Certifications in Enterprise & Systems Architecture

CSD&M

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We are **promoting** Systems Architecture

Enterprise Architecture

Systems Architecture



We are **training & coaching** operationally Systems Architects (≈ 500 real design projects)



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Agenda

- 1 Ecosystems from a System Perspective**
- 2 Elements of Systems Architecting**
- 3 Key Ingredients of Ecosystem Architecting**



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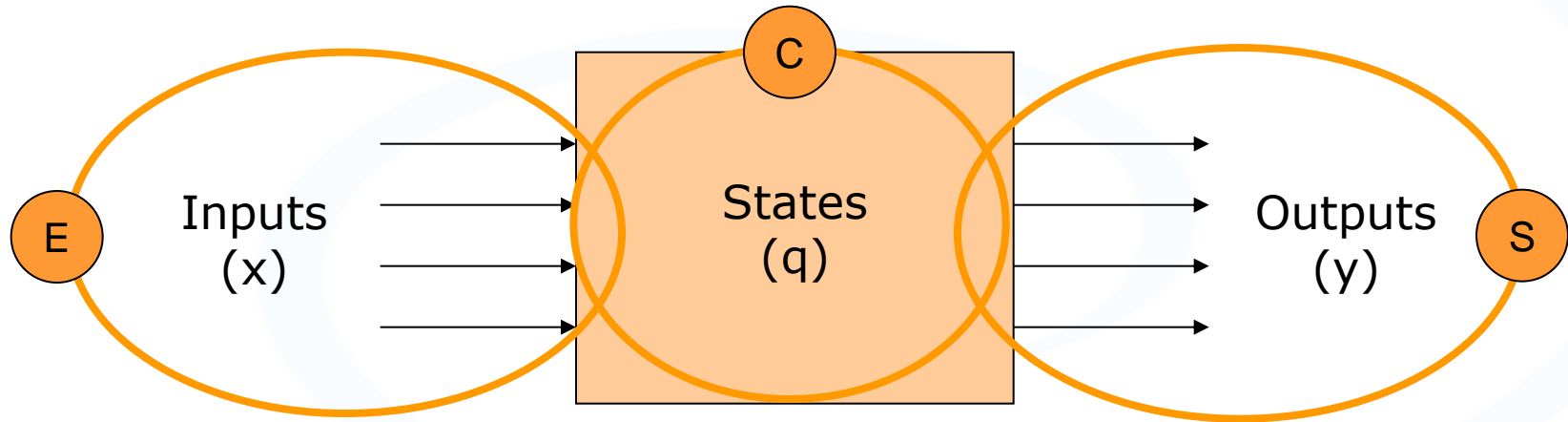
System Complexity Hierarchy

Type of system	Characteristics	Typical example	Design Strategy
Product Component	Does not exist independently of a product	 Aircraft engine	V-cycle
Product	Strong coupling of fixed components	Aircraft 	W-cycle
System of systems	Weak coupling between moving components	 Airport	Interfaces standardization
Ecosystem	Independent moving components	 Air Traffic Management	Actors Influence



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Note that all these are Systems!



Pre-conditions (needs & constraints of the considered system), resources, data, decisions, etc.

Internal processings

Post-conditions (needs & constraints of other systems), deliverables, energy, data, actions, etc.

A **(formal) system** is characterized by a **double input/output and internal behavior** which allows it – throughout **time (t)** – to transform **inputs (x)** into **outputs (y)** depending on **its internal states (q)** and to change the value of **its internal states (q)** depending of its **inputs (x)**



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2

Systems Architecting key Features (1/2)



← Chamonix from the Valley
(1.200 m upon sea)

Chamonix from the black
lake (2.000 m upon sea)



Key Feature 1: analyzing problems from a high level rather from a low level perspective



2

Systems Architecting key Features (2/2)

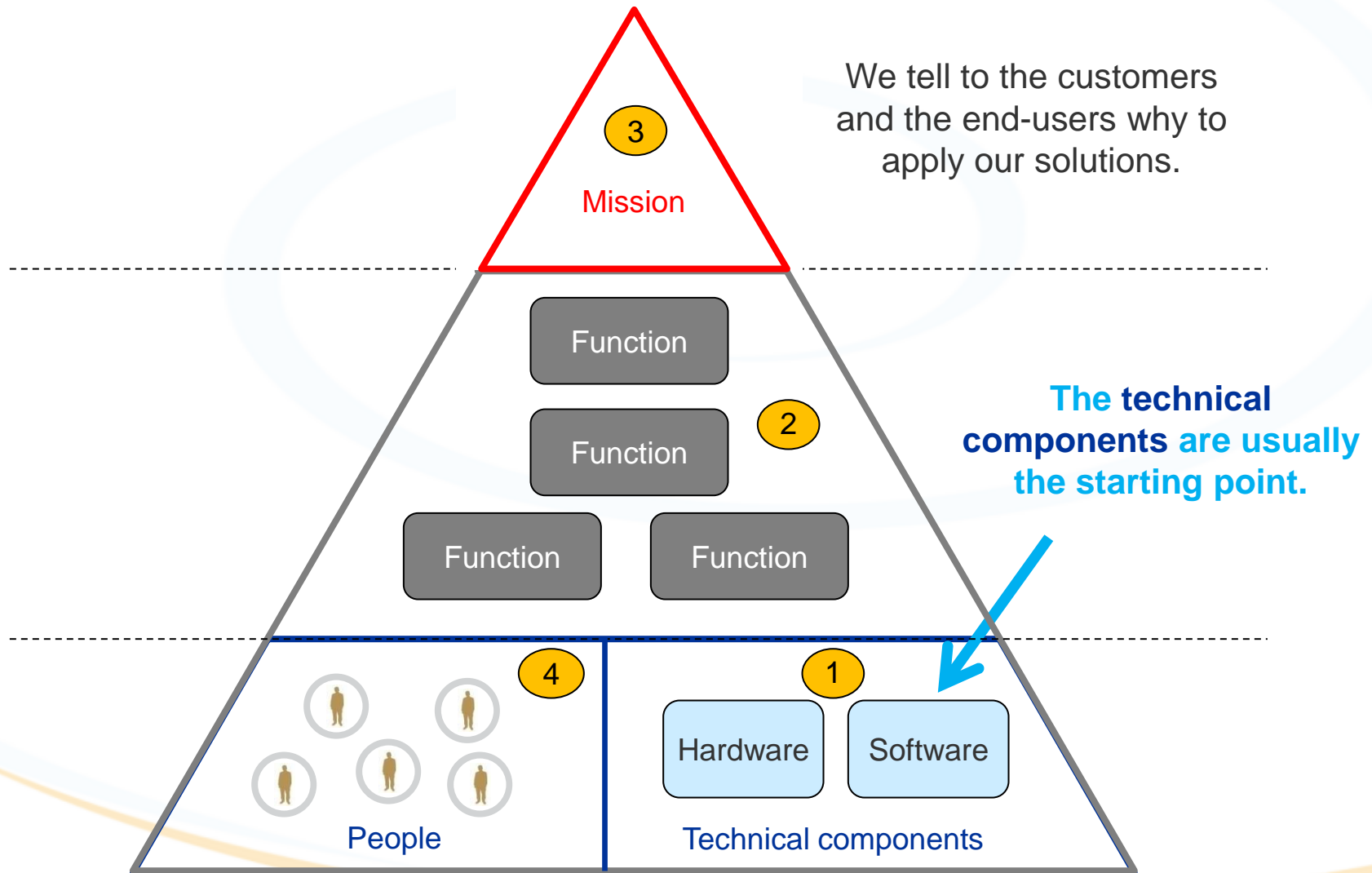


Key Feature 2: analyzing problems from a **global multi-disciplinary perspective** rather from a **local mono-expertise perspective**



2

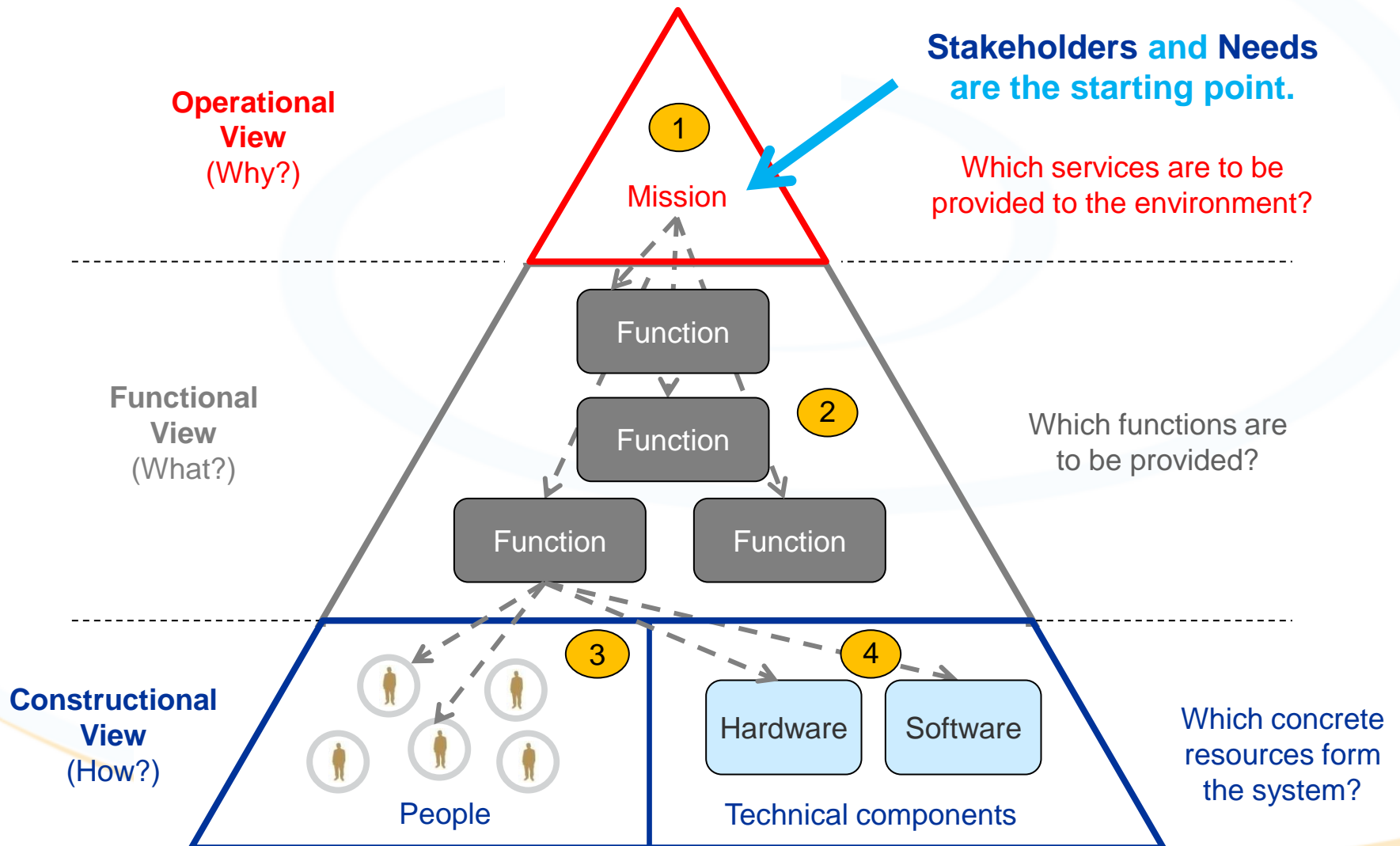
Systems Architecting: Evolving from a Bottom-Up Technical-Oriented Design Approach ...





2

... To a Top-Down & Stakeholder-Focused System Design Strategy





3

Agenda

1

Ecosystems from a System Perspective

2

Elements of Systems Architecting

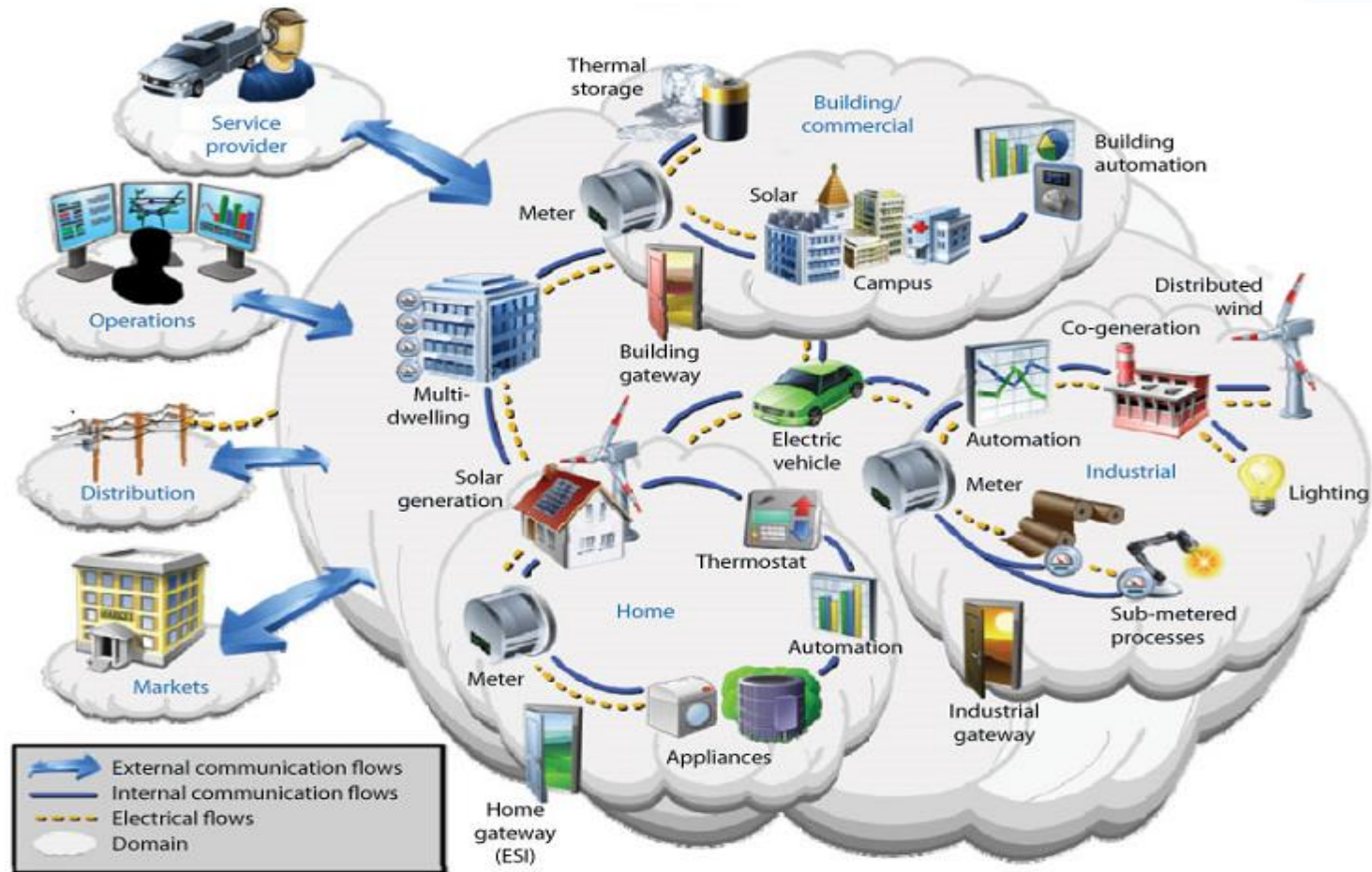
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Key Ingredients of Ecosystem Architecting



3

Let us go back to Ecosystems Design ...



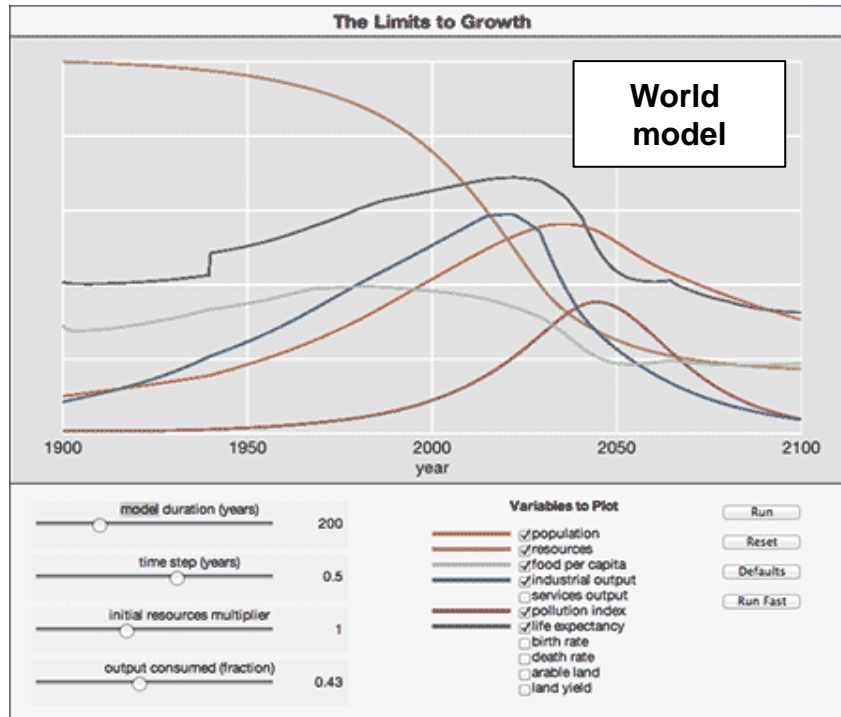
The Example we will use: the **Electrical Vehicle Ecosystem**
The problem to solve is to define its **dissemination strategy** within a territory



3

Key point 1: analyze the Strengths & the Weaknesses of the “As is” situation

As is weakness



Fossil energies are not eternal

Systemic models are predicting that world growth cannot continue up to eternity in the current economic paradigm ...

As is strength



A distribution infrastructure that works

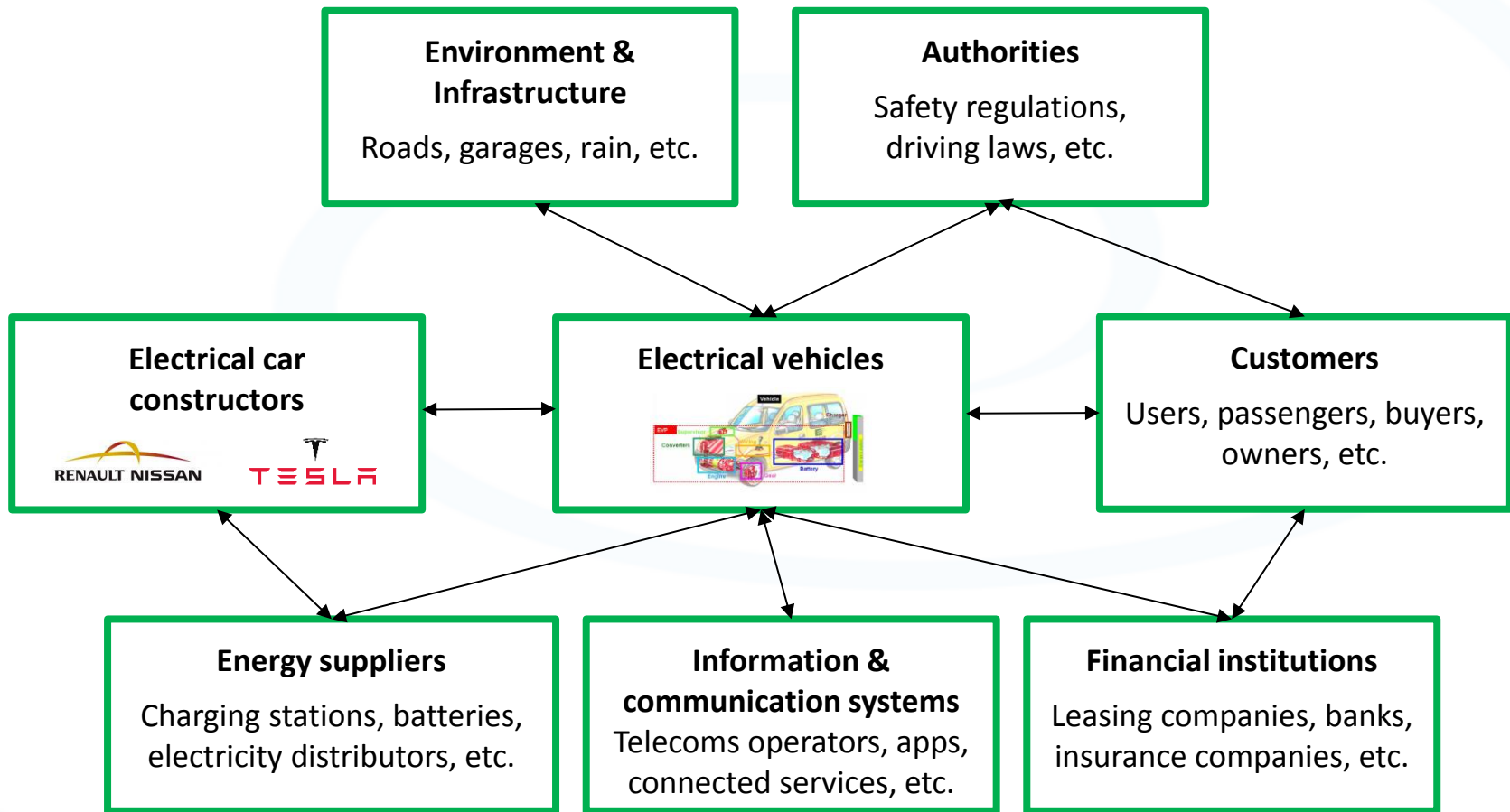
As is represents billions of investments and hundred thousands of jobs

Analyzing the **strengths and weakness of the “as is” situation** is key to see whether **it's the good time to start to develop a new ecosystem**



3

Key point 2: define a Win-Win “To be” Vision



The **good win-win “To be” vision** can be seen as a **Nash equilibrium** that can be analyzed by means of Game Theory techniques



3

Key point 3: construct an Integrated Implementation Roadmap & an Actor Influencing Strategy

2010

2015

2025 ?

<i>Customers usages</i>	None	Some	...	Everybody
<i>Customers services</i>	None	Some	...	A lot
<i>Electrical infrastructure</i>	None	Weak	...	Strong & everywhere
<i>Information system infrastructure</i>	None	Some	...	Strong & everywhere

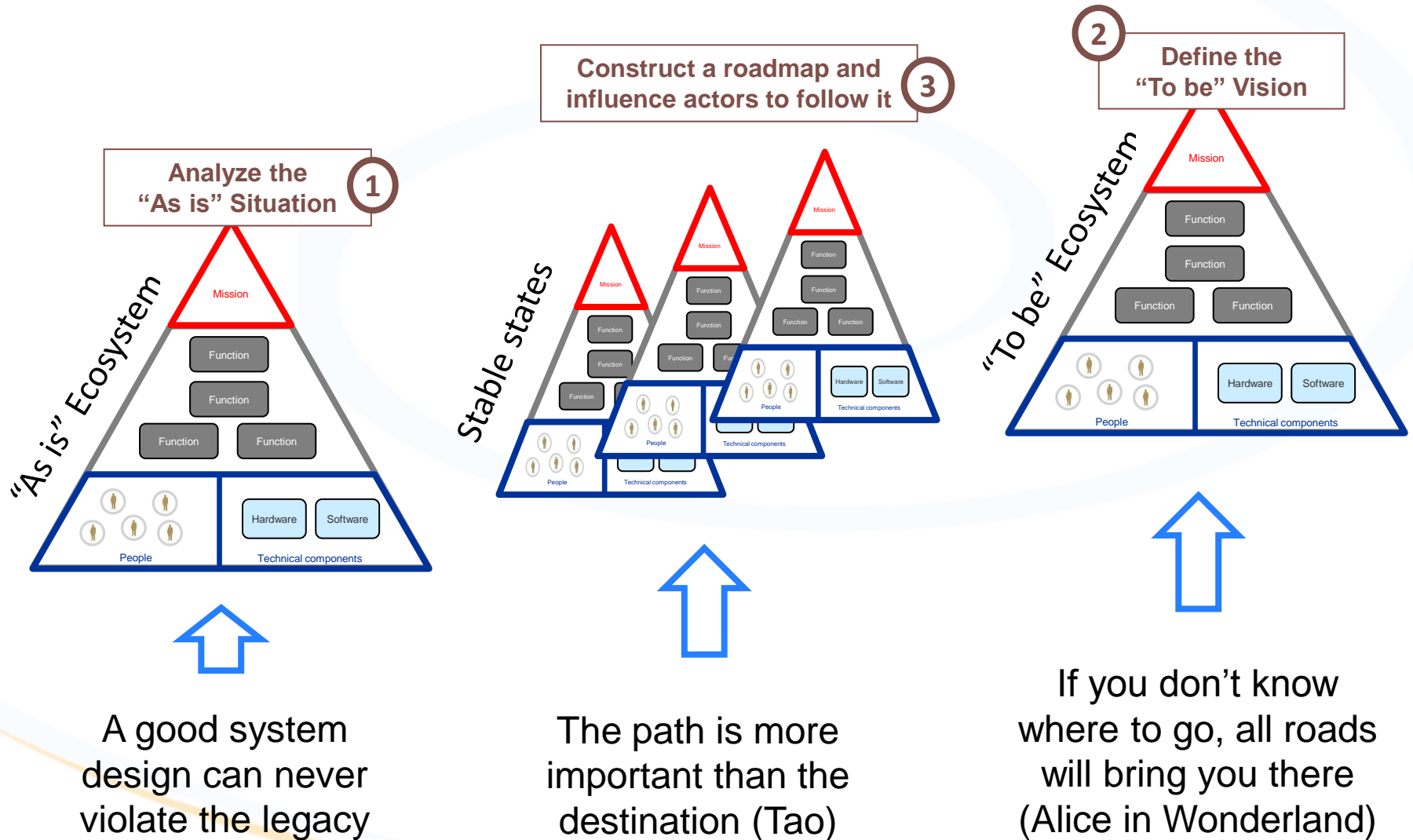
As is To be

Finding the **good temporal milestones & rhythm** while maintaining the **alignment of the different components of the ecosystem & influencing key actors to move in the same direction** is key ...



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Conclusion: the key Ingredients of an efficient Ecosystem Design Strategy





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