



Smart City and Smart Mobility Business Models: A Review of the State-of-the-Art

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Outline

- **Part 1:**
Overview of basic concepts
- **Part 2:**
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- **Part 3:**
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- **Part 4:**
Next steps



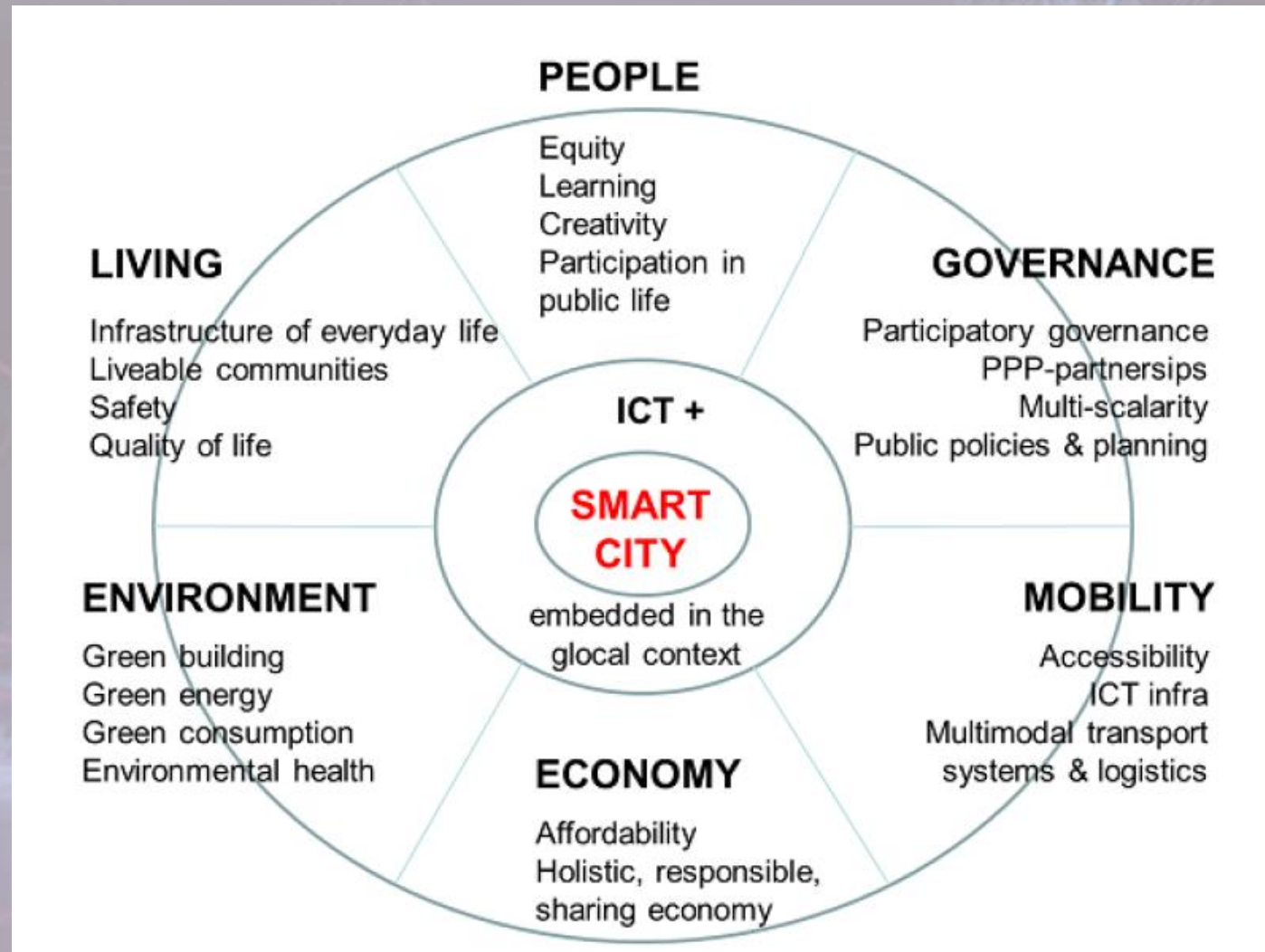
Part 1:

Overview of basic concepts

Smart City

- As defined by United Nations, **Smart City** is an innovative city that uses **ICTs** and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while **ensuring** that it **meets** the needs of present and future generations with respect to **economic, social, environmental** as well as **cultural** aspects.”(*Sustainable Smart Cities* / *UNECE*, n.d.).
- “A Smart City is a city that – meets the needs of its present inhabitants – without compromising the ability for other people or future generations to meet their needs, and thus, **does not exceed local or planetary environmental limitations**, and – where this is supported by as known by all of us as ICT.” (Höjer & Wangel, 2014)

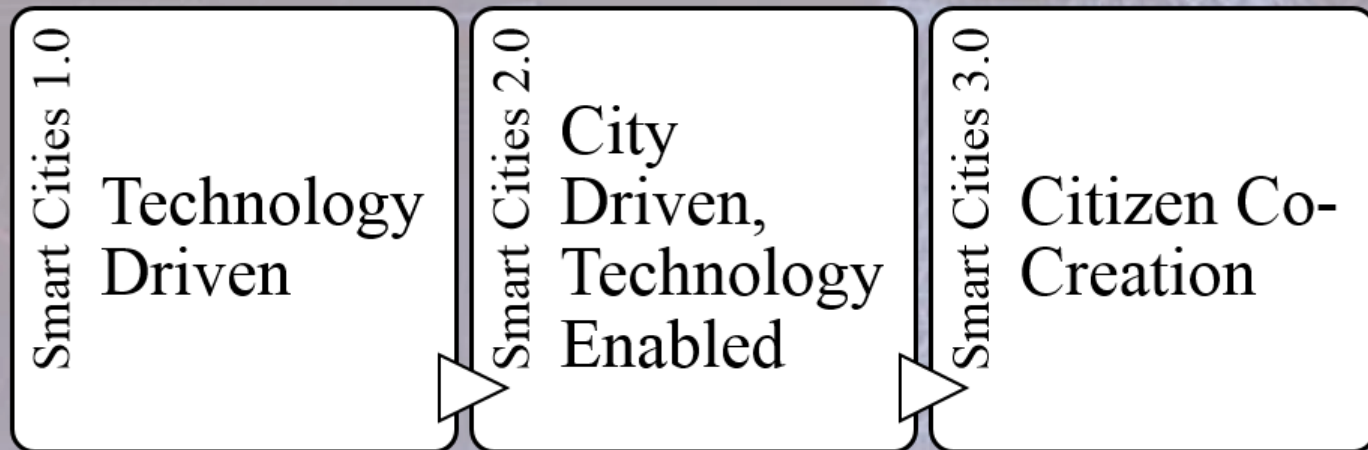
Smart Cities Wheel Model



Overview of the goals of a Smart City

Economical	Environmental	Social
To Cultivate Innovation and Start up Culture (Gopinath et al., 2008)	Reduce CO2 Emissions drastically leading to slower down Climate Change (Le Quéré et al., 2020) For e.g. To reduce 95% CO2 emissions in Oslo & Norway by 2030 (Bjerkan & Seter, 2021)	Improve quality of daily life for their citizens (R. P. Dameri, 2017)
Sustainable Commercial Development (City Branding)		Community building and citizen engagement
Encouraging sharing of existing resources and reducing emissions and creating infrastructure and investments for Electric and Autonomous Vehicles (Al-Kaisy, 2022)	Align with National Transport Plans, for e.g. To achieve Norway National Transport Plan 2018-2029 to be zero emission.(O’Born et al., 2018)	Providing customized services for inhabitants (or visitors)
		Value creation in tourist-oriented municipalities in regional Norway

Different phases and evolution of Smart Cities

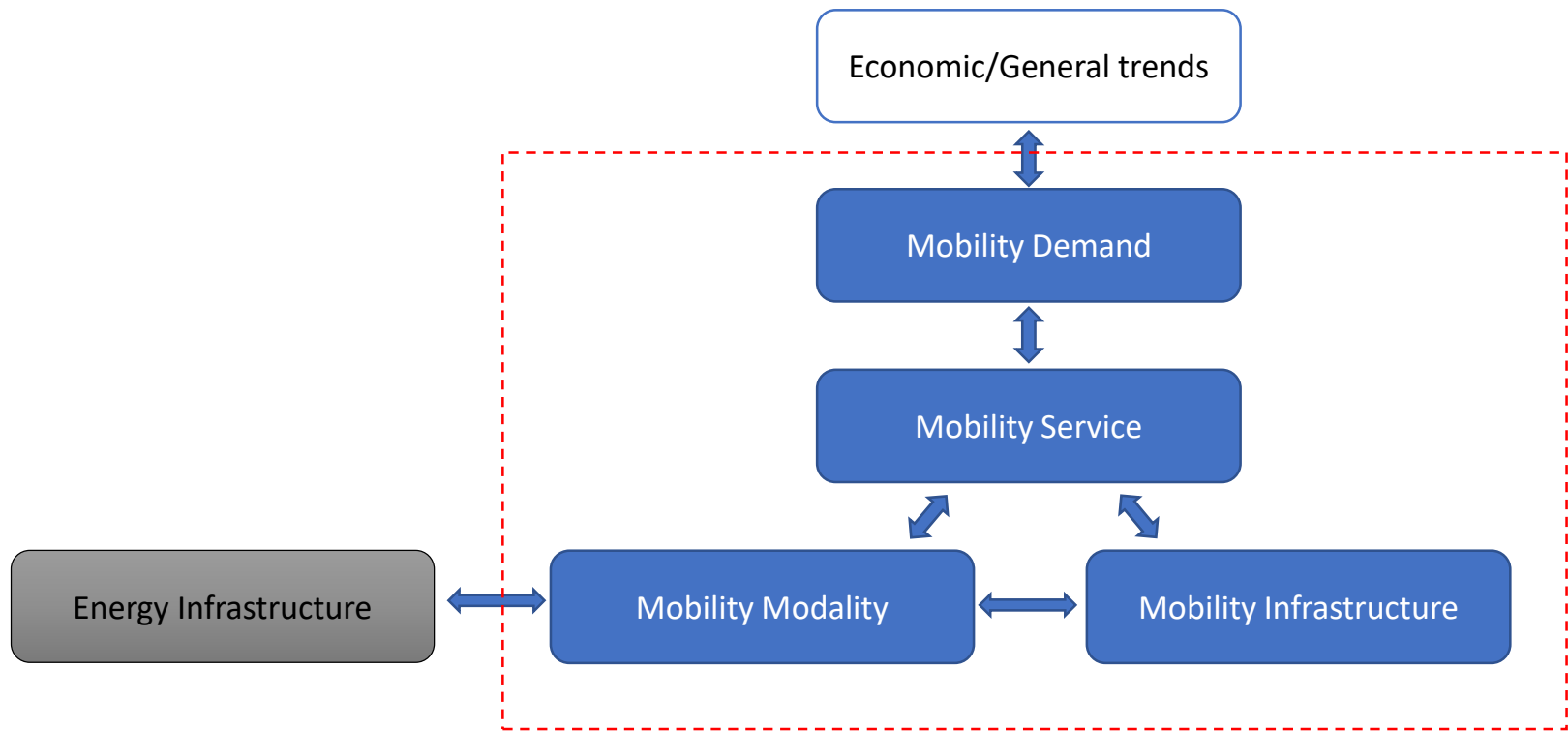


What is Smart Mobility

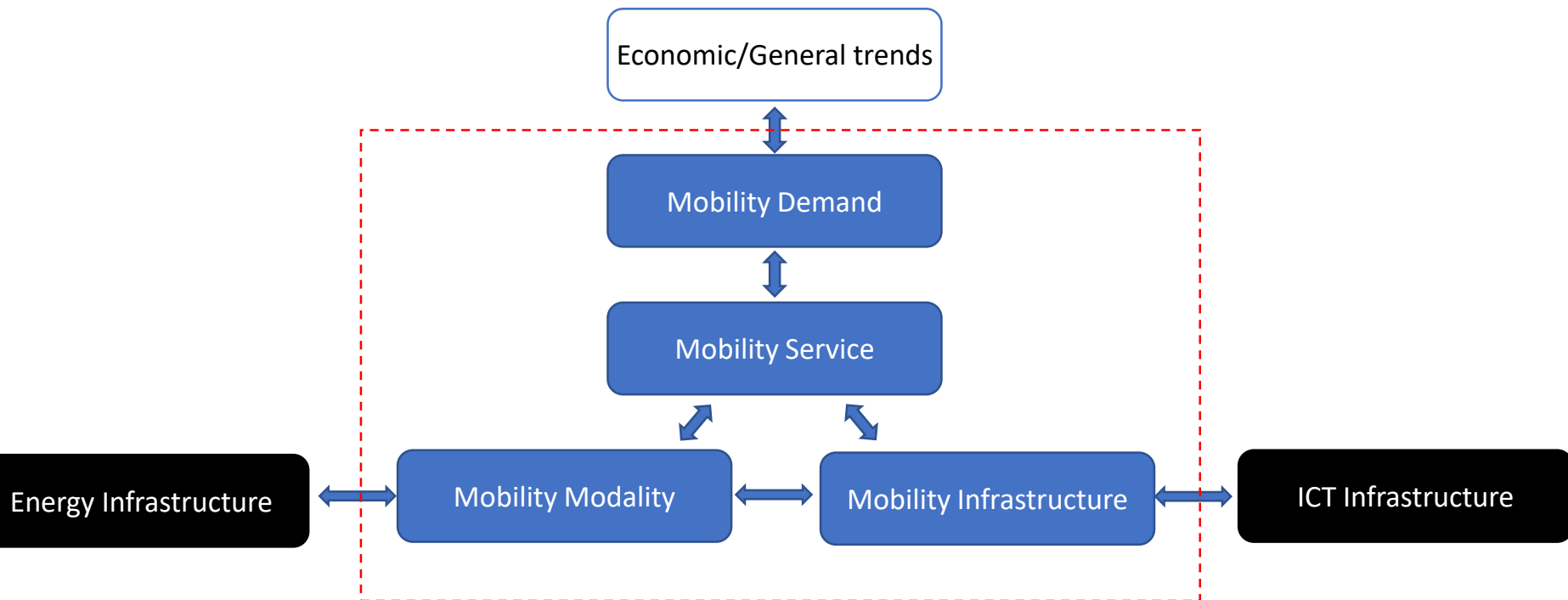
- “the use of **Information and Communication Technology** in modern transport technologies to improve **urban traffic**”. (Albino et al., 2015).
- “is a concept of comprehensive and smarter future traffic service in combination with **smart technology**. A Smart Mobility society is realized by means of the current intelligent traffic systems”. (Chun & Lee, 2015).
- “local and supra-local accessibility, availability of ICTs, modern, sustainable and **safe transport systems**”. (Faria et al., 2017).
- The aim is “**Zero Emissions, Zero Accidents, Zero Ownership**” (Neckermann, 2015).

+ Customized transport services
+ Improved Citizens' accessibility to transport service

Mobility system



Smart Mobility system



Dimensions of Smart Mobility



Source: Faria, R., Brito, L., Baras, K. & Silva, J. (2017). Smart mobility: a survey. In 2017 International Conference on Internet of Things for the Global Community (IoTGC).

Smart Mobility Stakeholders



Trends influencing Smart Mobility

General Trends

- Environmental Conscious Citizens
- Hybrid Working Style
- Aging Population

Specific Mobility Trends

- Mobility as a Service
- Shared Mobility
- On-demand Transport
- Green Mobility and Electric Vehicles
- Autonomous Vehicles and Drones

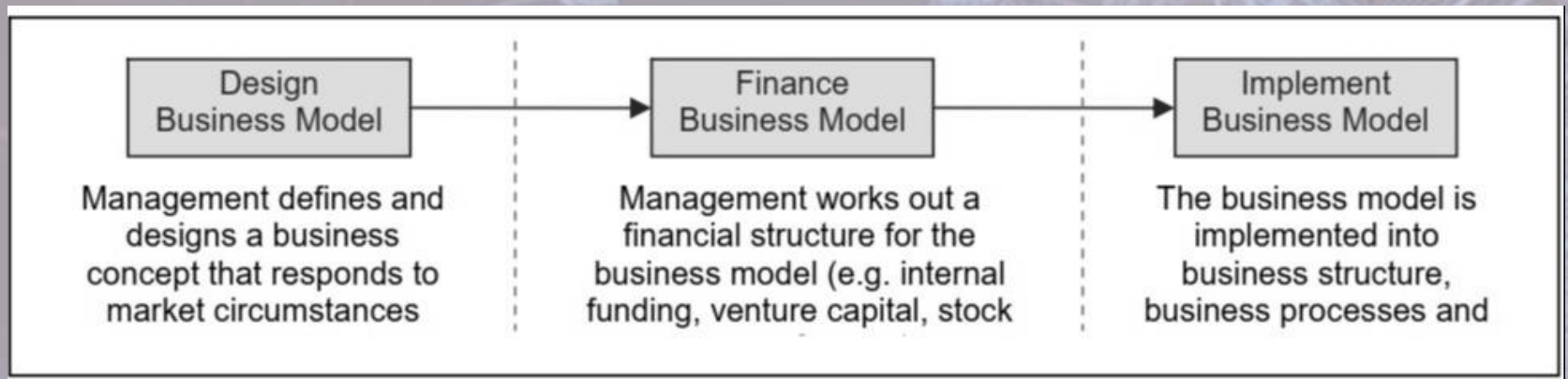


Part 2: Business models for Smart Mobility

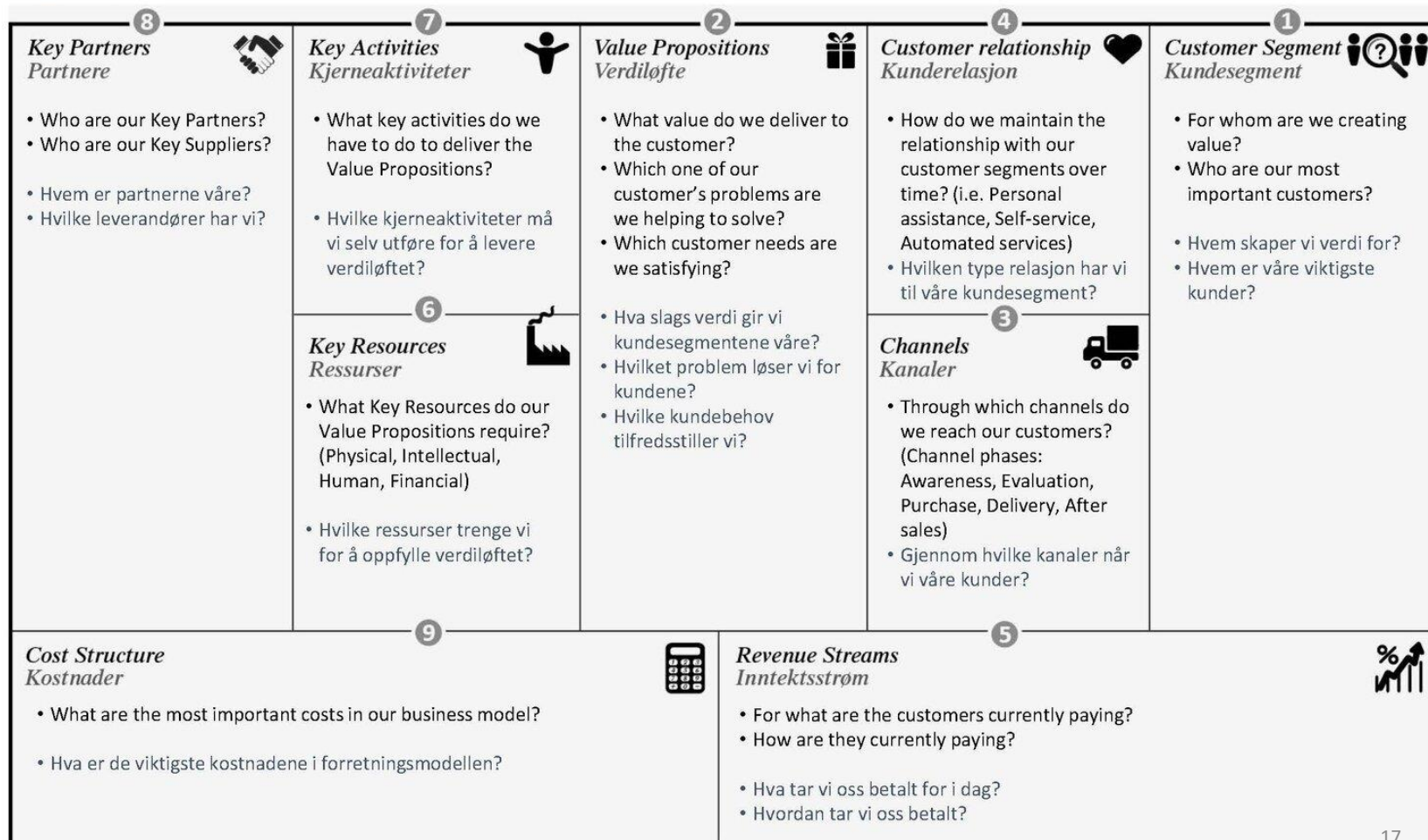
Business model definition

- A business model is a company's core profit-making plan which defines the **products** or **services** it will sell, its **target market**, and any **expected costs/Benefit**.
- A business model is a **conceptual tool** containing a set of objects, concepts, and their relationships with the objective to **express the business logic** of a specific organization (Osterwalder, 2005).

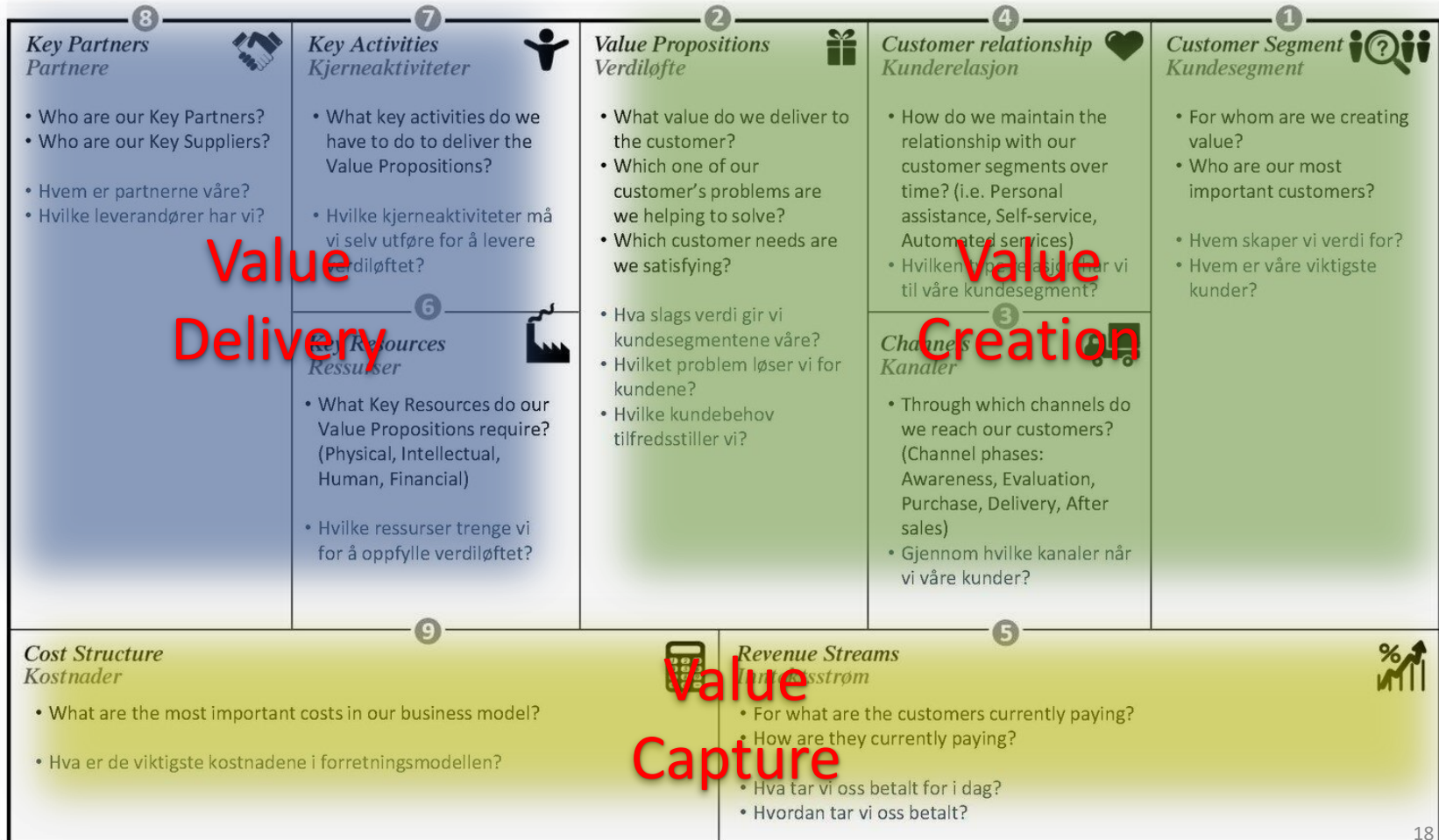
The role and steps in Business Design



Business model Canvas



Business model Canvas



Value
Delivery

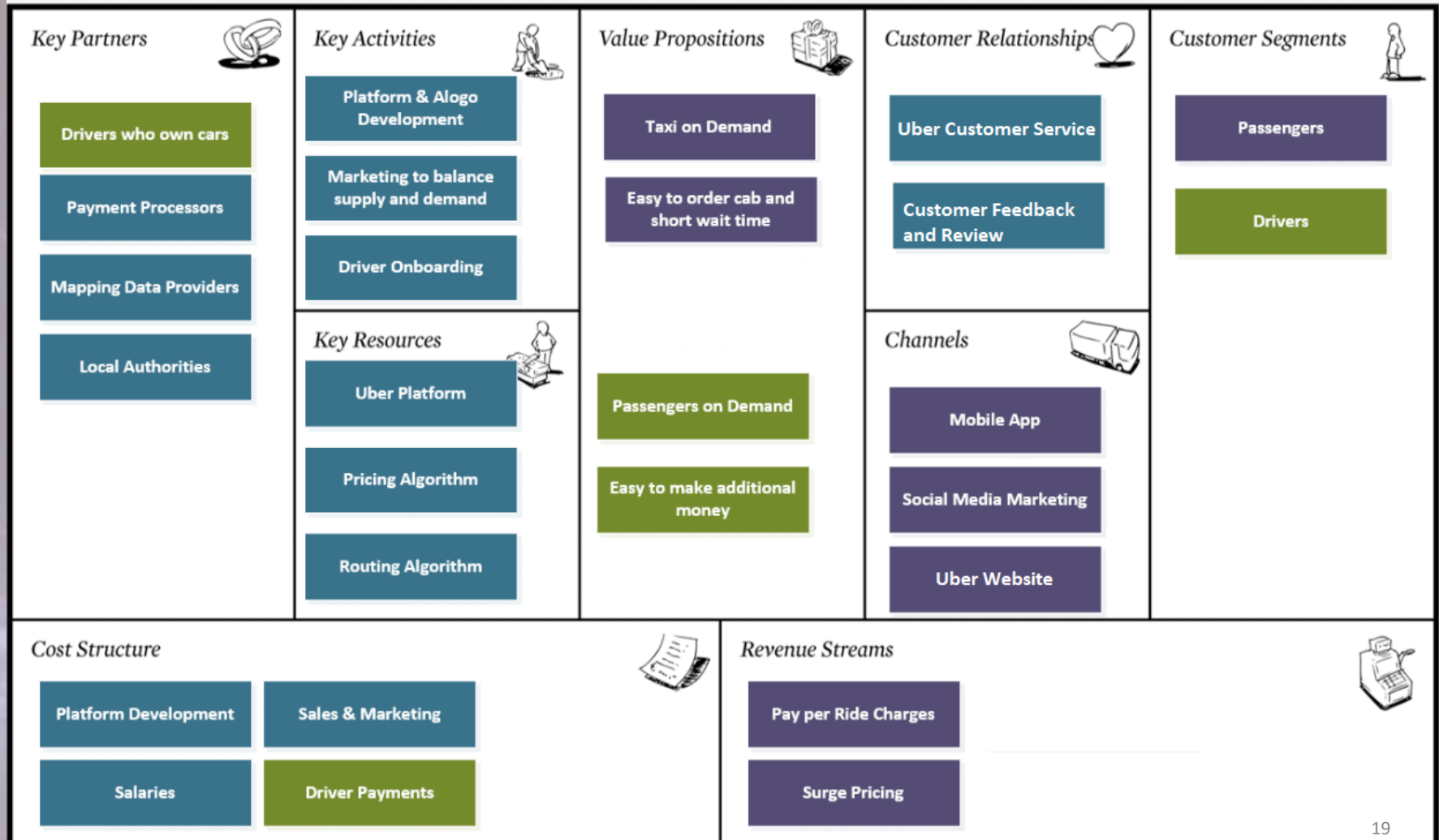
Value
Creation

Value
Capture

Business model Canvas: one example

The Business Model Canvas

Designed for: **Uber**



Sustainable Business Model Canvas



Sustainable Business Model Canvas











The *Sustainable* Business Model Canvas

Designed for:

Designed by:

On:

Version:

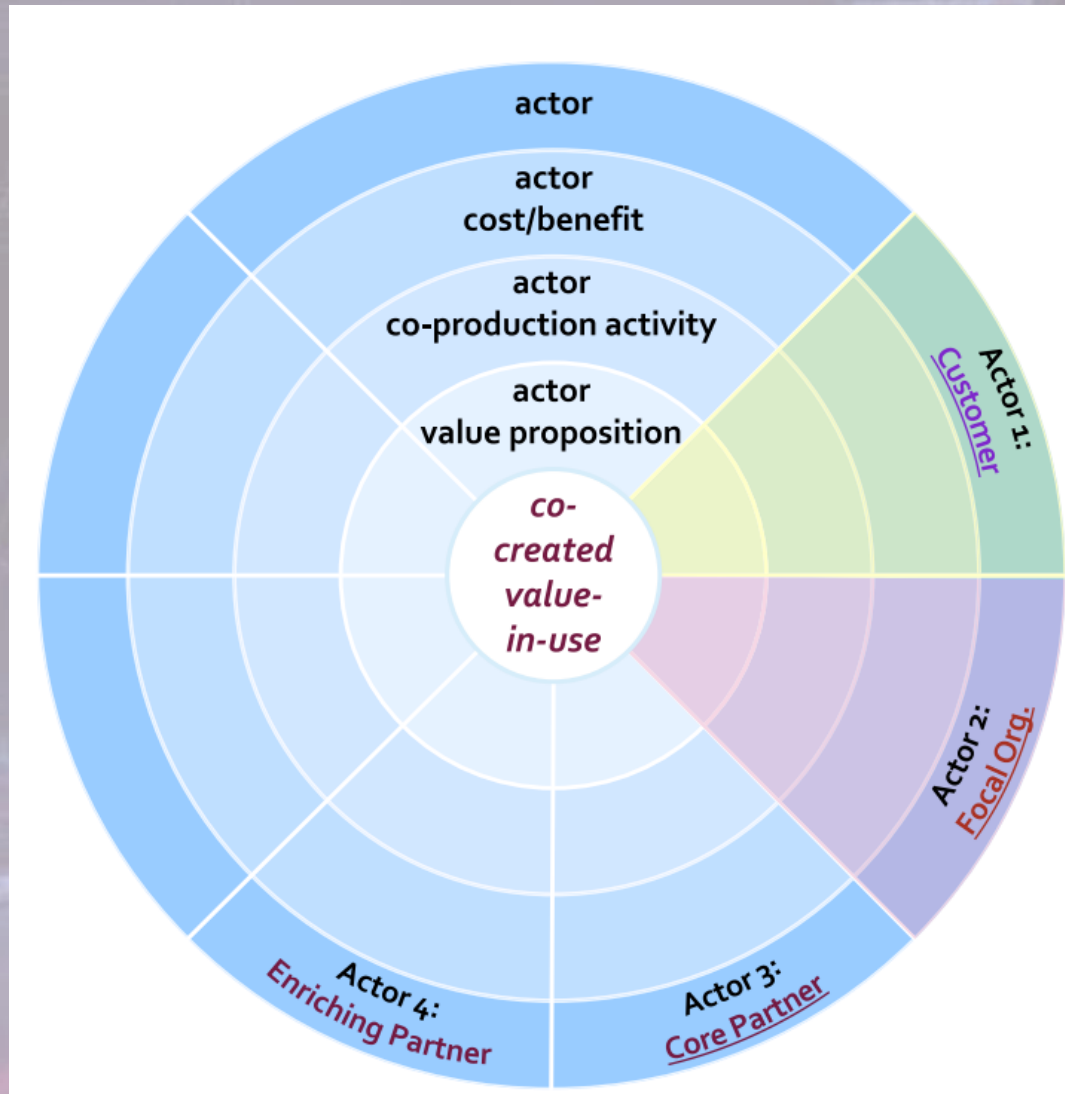
Key Partners  <p>Who are our Key Partners? Who are our key suppliers? Which Key Resources are we acquiring from partners? Which Key Activities do partners perform?</p> <p>MOTIVATION FOR PARTNERSHIPS: Optimization and economy Reduction of risk and uncertainty Acquisition of particular resources and activities</p>	Key Activities  <p>What Key Activities do our Value Propositions require? Our Distribution Channels? Customer Relationships? Revenue Streams?</p> <p>CATEGORIES: Production Problem Solving Platform/Network</p>	Value Propositions  <p>What value do we deliver to the customer? Which one of our customer's problems are we helping to solve? What bundles of products and services are we offering to each Customer Segment? Which customer needs are we satisfying?</p> <p>CHARACTERISTICS: Newness Performance Customization „Getting the Job Done“ Design Brand Status Price Cost Reduction Risk Reduction Accessibility Convenience/Usability</p>	Customer Relationships  <p>What type of relationship does each of our Customer Segments expect us to establish and maintain with them? Which ones have we established? How are they integrated with the rest of our business model? How costly are they?</p> <p>EXAMPLES: Personal Assistance Dedicated Personal Assistance Self-Service Automated Services Communities Co-Creation</p>	Customer Segments  <p>For whom are we creating value? Who are our most important customers?</p> <p>POSSIBILITIES: Mass Market Niche Market Segmented Diversified Multi-sided Platform</p>
Key Resources  <p>What Key Resources do our Value Propositions require? Our Distribution Channels? Customer Relationships? Revenue Streams?</p> <p>TYPES OF RESOURCES: Physical Intellectual (brand patents, copyrights, data) Human Financial</p>		Channels  <p>Through which Channels do our Customer Segments want to be reached? How are we reaching them now? How are our Channels integrated? Which ones work best? Which ones are most cost-efficient? How are we integrating them with customer routines?</p> <p>CHANNEL PHASES: 1. Awareness 2. Evaluation 3. Purchase 4. Delivery 5. After Sales (post purchase customer support) ... of products & services and Value Proposition</p>		
Cost Structure  <p>What are the most important costs inherent in our business model? Which Key Resources are the most expensive? Which Key Activities are most expensive?</p> <p>IS YOUR BUSINESS MORE: Cost Driven (lowest cost structure, low price value proposition, maximum automation, extensive outsourcing) Value Driven (focussed on value creation, premium value proposition)</p> <p>SAMPLE CHARACTERISTICS: Fixed Costs (salaries, rents, utilities) Variable Costs Economies of Scale Economies of Scope</p>		Revenue Streams  <p>For what value are our customers really willing to pay? For what do they currently pay? How would they prefer to pay? How much does each Revenue Stream contribute to overall revenues?</p> <p>TYPES: Asset Sale Subscription Fees Licensing Usage Fee Lending/Renting/Leasing Brokerage Fees</p> <p>FIXED PRICING: List Price Product feature dependent Customer segment dependent Volume dependent</p> <p>DYNAMIC PRICING: Negotiation (bargaining) Yield management Real-time Market</p>		
Eco-Social Costs  <p>What ecological or social costs is our business model causing? Which Key Resources are non-renewable? Which Key Activities use a lot of resources?</p> <p>EVALUATION INSTRUMENTS: Life-Cycle Assessment (of products and services) Common Good Balance Sheet</p>		Eco-Social Benefits  <p>What ecological or social benefits is our business model generating? Who are the beneficiaries? Are they potential customers? Can we transform the benefits into a Value Proposition? If yes, for whom?</p> <p>INSTRUMENTS: Social Reporting Standard Common Good Balance Sheet</p>		

Based on: www.businessmodelgeneration.com

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Service-dominant Business Model



Smart City Business Model

Key Actors Who are the smart city network key actors? (City, end-user, core partner, supporting partner) Who are the key suppliers?	Key Activities Which key activities are required to realize the value proposition?	Value Proposition What value does each actor deliver? Which of the end users’ problems does the smart city solution is going to solve? What are the respective target values- KPIs to be reached?	Actor Relationship What type of relationship does each actor expect within the network? Which ones are established? How are they integrated with the rest of our BM?	Network Beneficiaries What target users is the value created for? How the target users benefit from the value created and what are their needs? What specific values each network beneficiaries get?
Key Actors Offering (*) What offering does each actor deliver?	Key Resources and Infrastructure What key resources are required for to realize the value proposition?	Data (*) What data will be made available from the service designed? To whom and under what conditions? Availability and types of Open Data	Deployment and Channels Through which channels do our customers want to be reached? How are we reaching them now? How are our channels integrated? Which ones work best? Which ones are most cost efficient? How are they integrating with the customer routines?	
Key Actors co-creation operation (*) Which key operations do the key actors perform?				
Budget Cost What are the most important costs inherent for each actor deploying a smart city solution? Which key resources and key activities are the most expensive? What cost can be covered by each actor? Is there opportunity for blending public funding with private financing?			Revenue Stream For what value are the network beneficiaries being willing to pay? For what do they currently pay? How are they currently paying? How much would they prefer to pay? How much does each revenue stream contributing to overall revenues? Which actors have revenues? What are the non-monetary revenues?	
Environmental Impacts: Costs and Benefits What is the ecological cost of the smart city solution? What is the ecological benefit of the smart city solution? The percentage of reducing energy consumption The percentage of reducing the environmental footprint			Social Impacts: Value and costs What is the negative social value created by the smart city solution? What is the positive social value generated by the smart city solution?	

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Smart Mobility Business Model Framework

Network Partners -Who are the smart city network partners? (city, end-user, core partner, supporting partner) -who are the key suppliers?	Key Activities -Which key activities are required to realize the value proposition? -What are the side effects of these activities on the environment and society?	Value proposition -What value does each partner deliver considering the social and environmental aspects? -Which of the end-users problem does the smart mobility solution going to solve? -What are the key respective target values-KPIs to be reached?	Network relationship -What type of relationship does each partner expect within the network? -Which ones are established? -How are they integrated with the rest of our BM?	Network Beneficiaries -What target users are the value created for? -How do the target users benefit from the value created and what are their needs? -What specific values does each network beneficiary get?
Network Partners offering -What offer does each actor deliver?(Technology, R&D, IP rights)	Key resources -What key resources are required to realize the value proposition? (Physical resources, Human resources, Data)		Deployment and channels -Through which channels do our users want to be reached? -How are we reaching them now? -How are our channels integrated? -Which ones work best? -Which ones are most cost-efficient? -How are they integrating with the user's routines?	
Network partners co-creation operation -Which key operation does each partner perform? (Regulating, offering subsidies, partly funding)	ICT and infrastructure -What type of ICT and Infrastructure is needed? -Is it available now or not? -How it should be provided?			
Budget cost -What are the most important costs inherent for each partner deploying a smart mobility solution? -Which key resources and key activities are the most expensive? -What cost can be covered by each partner? -Is there an opportunity for blending public funding with private financing?			Revenue stream -For what value are the network beneficiaries willing to pay? -For what do they currently pay? -How are they currently paying? -How much would they prefer to pay? -How much does each revenue stream contribute to overall revenue? -Which partner has revenues?	
Environmental and social risks -What is the ecological cost of the smart mobility solution? -What is the ecological benefit of the smart city solution? -The percentage of reducing energy consumption, traffic congestion, noise, and air pollution -The percentage of reducing the environmental footprint		Environmental and social benefits -What is the positive social value generated by the smart mobility solution? -What is the negative social value created by the smart city solution?		

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Part 3: Evaluating business models for Smart Mobility

The Logic for Evaluating Smart Mobility Business Models

- Smart mobility is **not** smart only because of its **technical** innovation
- The organization should understand if the business model for the mobility solution is meant to be smart in the **city ecosystem** context
- Therefore, the **consistency** of the BM building blocks should be analyzed into the city ecosystem perspective
- A city ecosystem has enablers that affect timespan in which the Business model operates
- A BM for smart mobility rely on a supportive city ecosystem to deliver its maximum value
- A BM should objectively add value for the whole ecosystem

Smart City Ecosystems

- Business ecosystems consist in multiple industries and the **interactions** occur among suppliers, customers, competitors, stakeholders and the like - named participants, whose capabilities influence one and all in the way they **collaborate**.
- "In a business ecosystem, companies coevolve capabilities around a new innovation: they work **cooperatively** and competitively to support new products, satisfy customer needs, and eventually incorporate the next round of innovations" (Moore, 1993)
- Cities are ecosystems where sustainability is maintained through the **interactions** of urban components. The different stakeholders perform a more active role: private sector participation is key in projects; citizens can interact directly to city officials and generate useful data coming from digital footprints, social media and crowd sourcing; Governments foster the **collaboration** of different actors (Díaz-Díaz, 2017)

Smart City Ecosystems

- Trend

SMART CITY SERVICES



COMMUNICATIONS



ENERGY



ENVIRONMENT



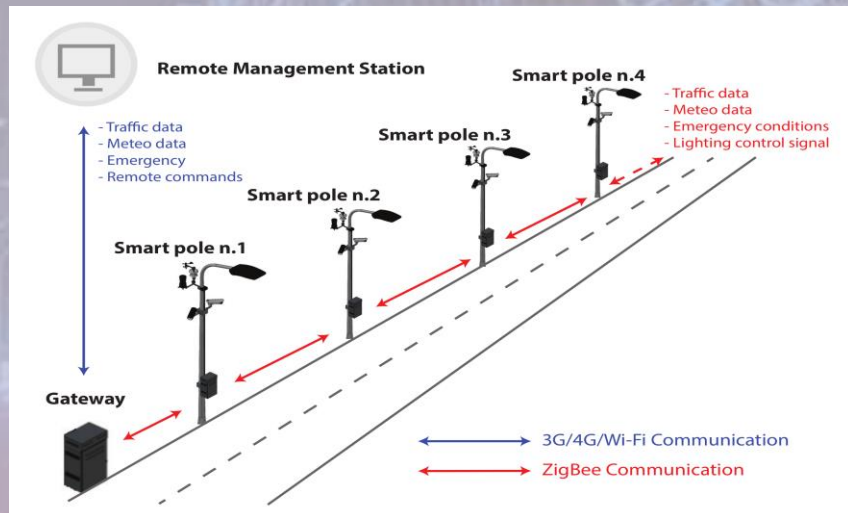
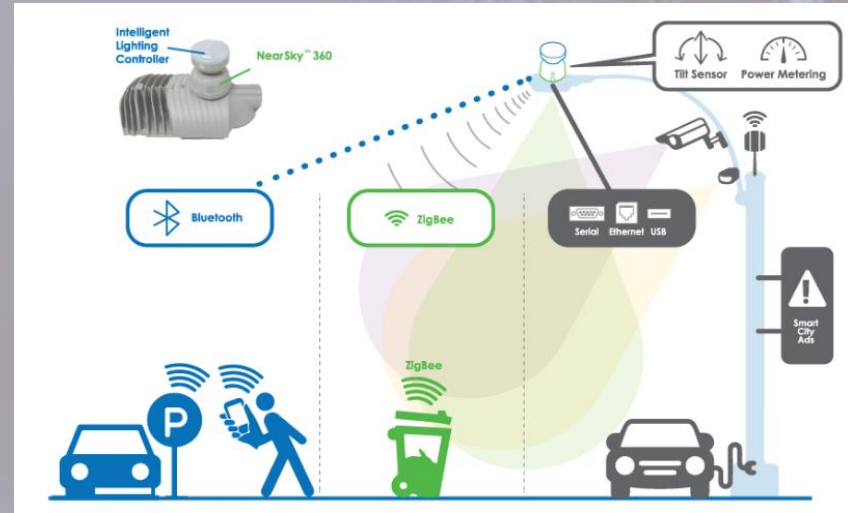
TRANSPORT



SAFETY

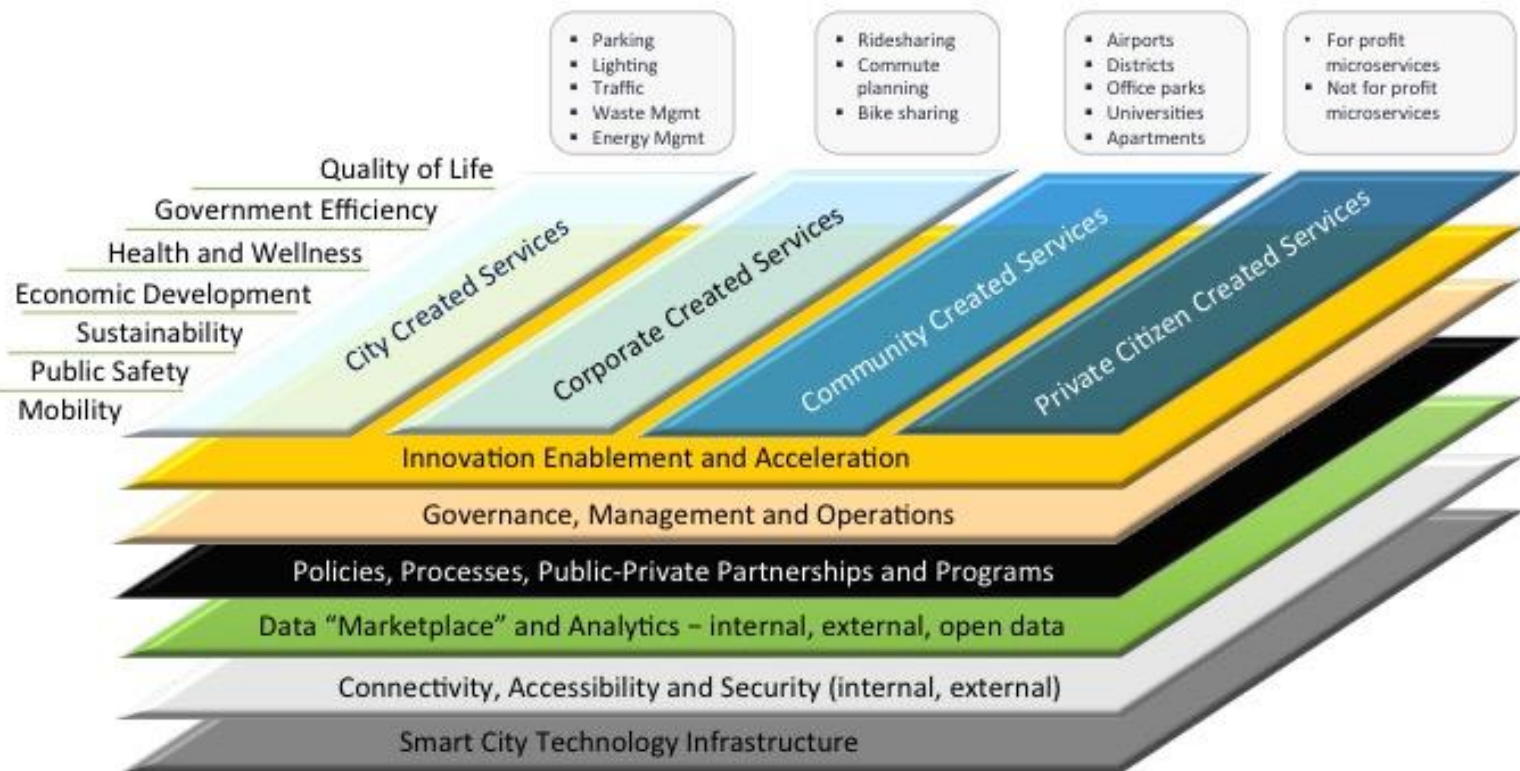


MEDIA



<https://ene-hub.com/offerings/products/smart-node/>
<http://www.smartercity.tech/smart-pole-node/>
<https://www.mdpi.com/2624-6511/3/4/71/htm>

Smart City Ecosystems

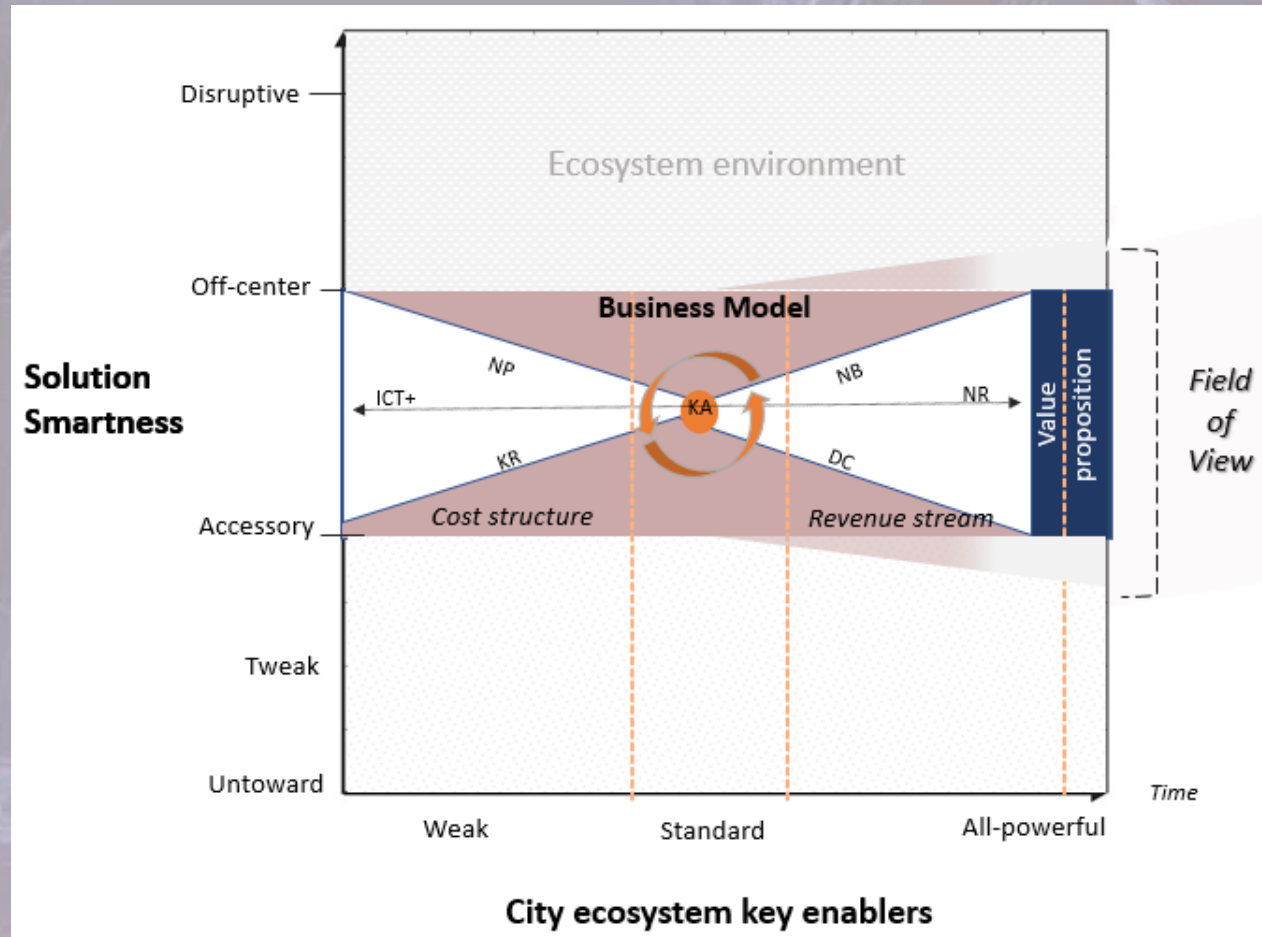


Source: StrategyofThings.io

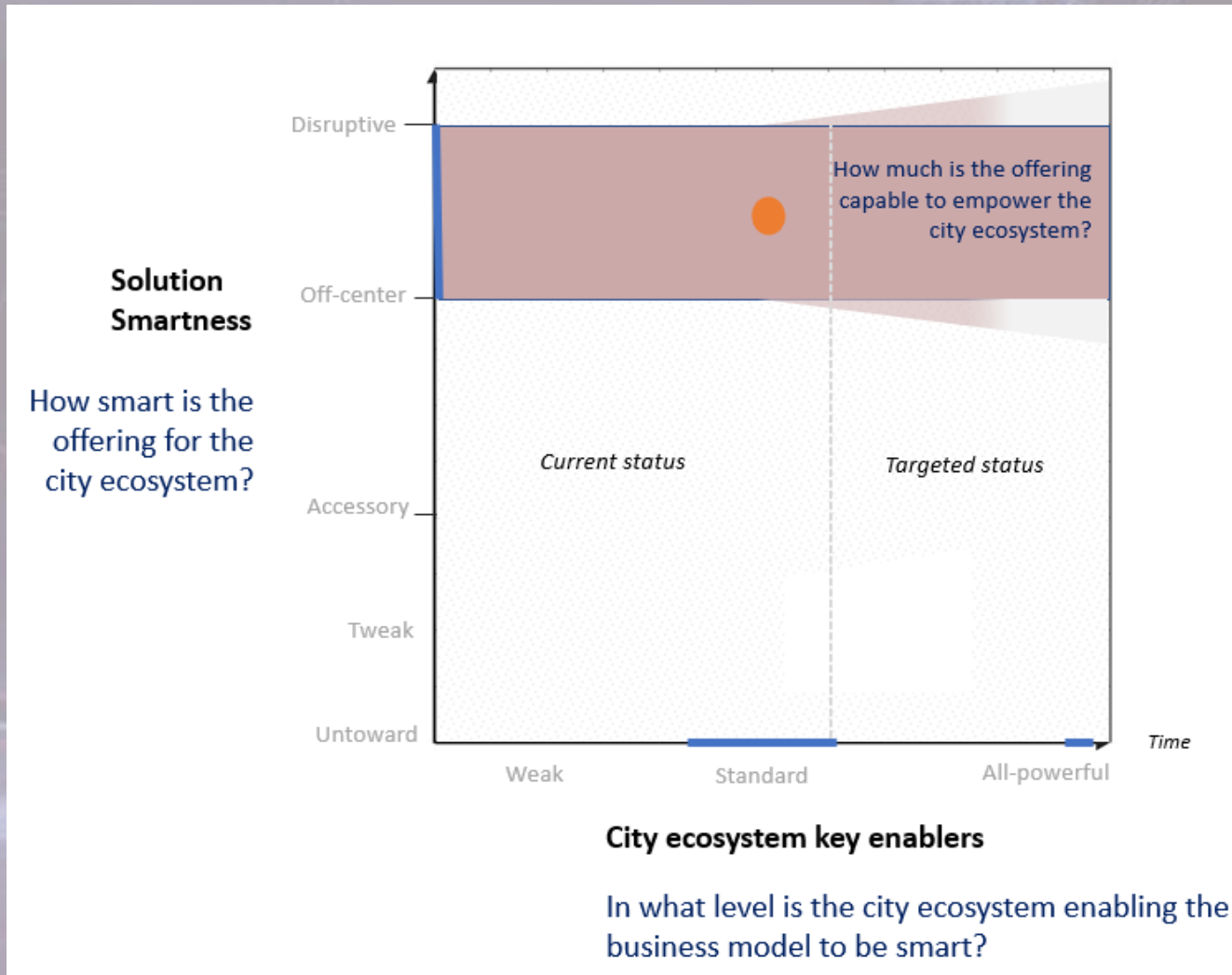
Evaluation framework for Smart Mobility Business Models

- The FM extends the traditional perspective of business models of delivering value for customer targets to delivering it to **multiple-actors** and natural environment of the **city ecosystem**.

- It aims to evidence where the business model stands in the city ecosystem in a current and future state.



Evaluation framework for Smart Mobility Business Models



Evaluation framework for Smart Mobility Business Models

Solution Smartness

Sense of purpose:

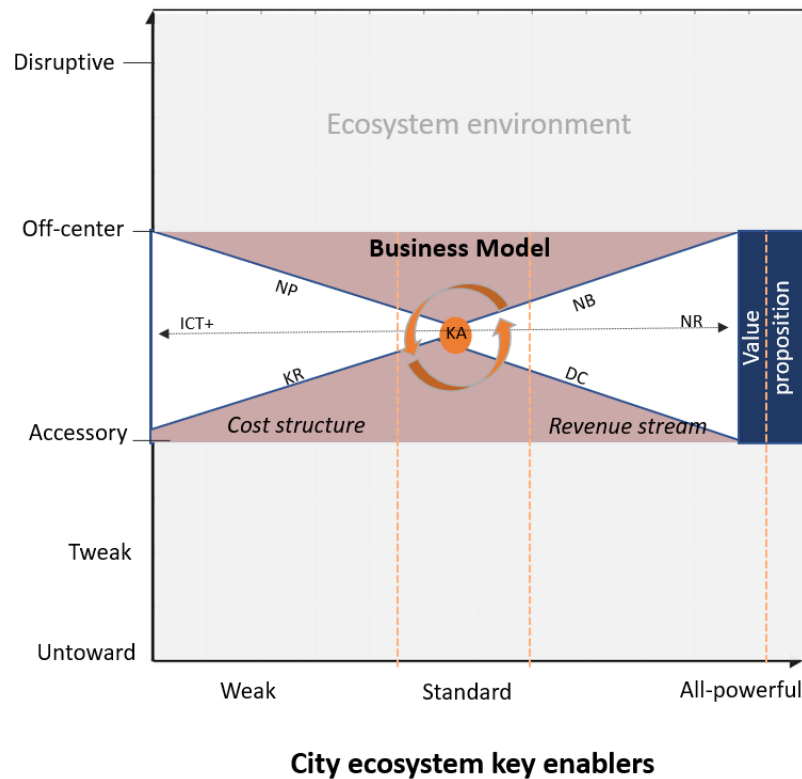
Market needs
Trends
Problem to solve
Existing modes of transportation
3 Building blocks

Organization:

Knowledge
Culture
Strategy: open innovation
Cross-departmental communication
Leadership

Mobility solution:

Technical innovation
Efficiency
Accessibility
Friendliness
Testing capabilities
Connection
Integration



City Governance | ICT

Evaluate: Public interests, policymaking, regulations, urban planning, transparency, open collaboration strategies, e-government, participatory. Connectivity, Smart pole network, security, overall ICT performance and accessibility

Activities behind: Coordination, Alignment, Integration, Private-public partnership

Threats:

Big data/security
Economic instability
Political decision-making
Shortcomings in other smart dimensions
Social behavior
Competitors

OUTCOMES

- Efficiency
- Quality of life
- Wellbeing
- Equity
- Accessibility
- Sustainable value

OUTCOMES

- Integration
- ICT empowerment
- Innovation
- Cross-sectoral engagement
- Growth
- Longevity

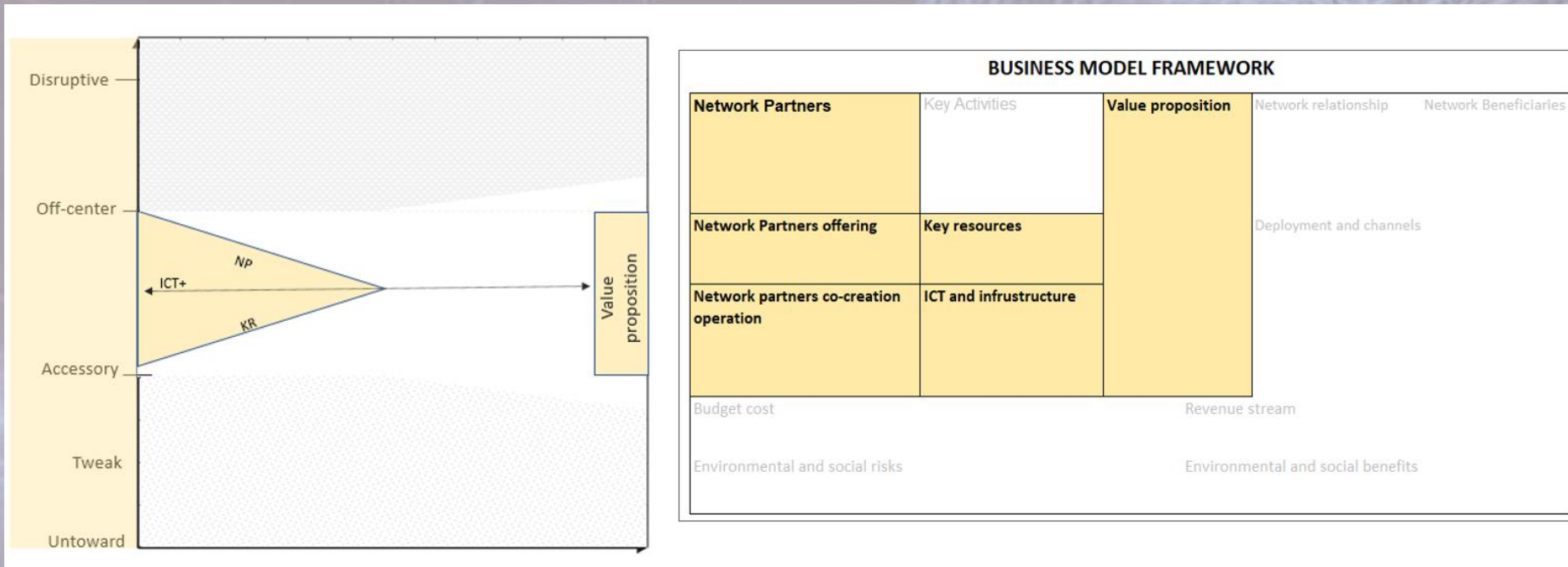
Evaluation framework for Smart Mobility Business Models

3 perspectives to look at:

The smartness of the offering (Y)

The city ecosystem key enablers (X)

The feedback loop zone (F)



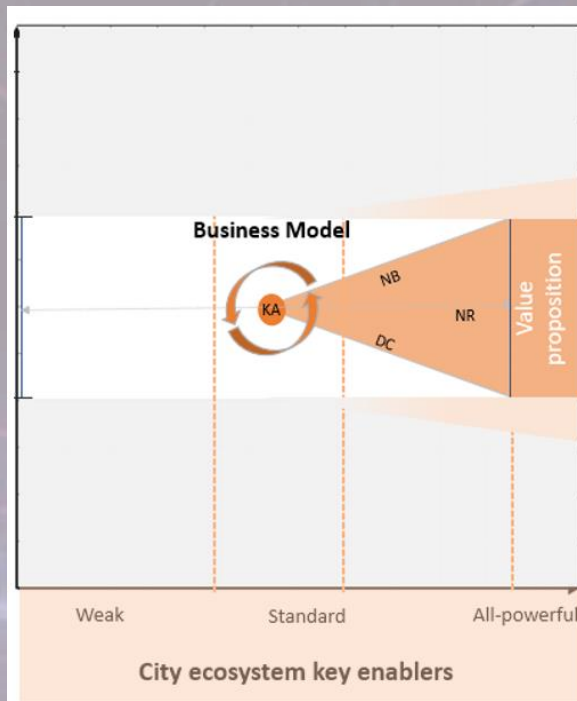
Evaluation framework for Smart Mobility Business Models

3 perspectives to look at:

The smartness of the offering (Y)

The city ecosystem key enablers (X)

The feedback loop zone (F)



BUSINESS MODEL FRAMEWORK				
Network Partners	Key Activities	Value proposition	Network relationship	Network Beneficiaries
Network Partners offering	Key resources	Revenue stream	Deployment and channels	
Network partners co-creation operation	ICT and infrastructure operation			
Budget cost				
Environmental and social risks		Environmental and social benefits		

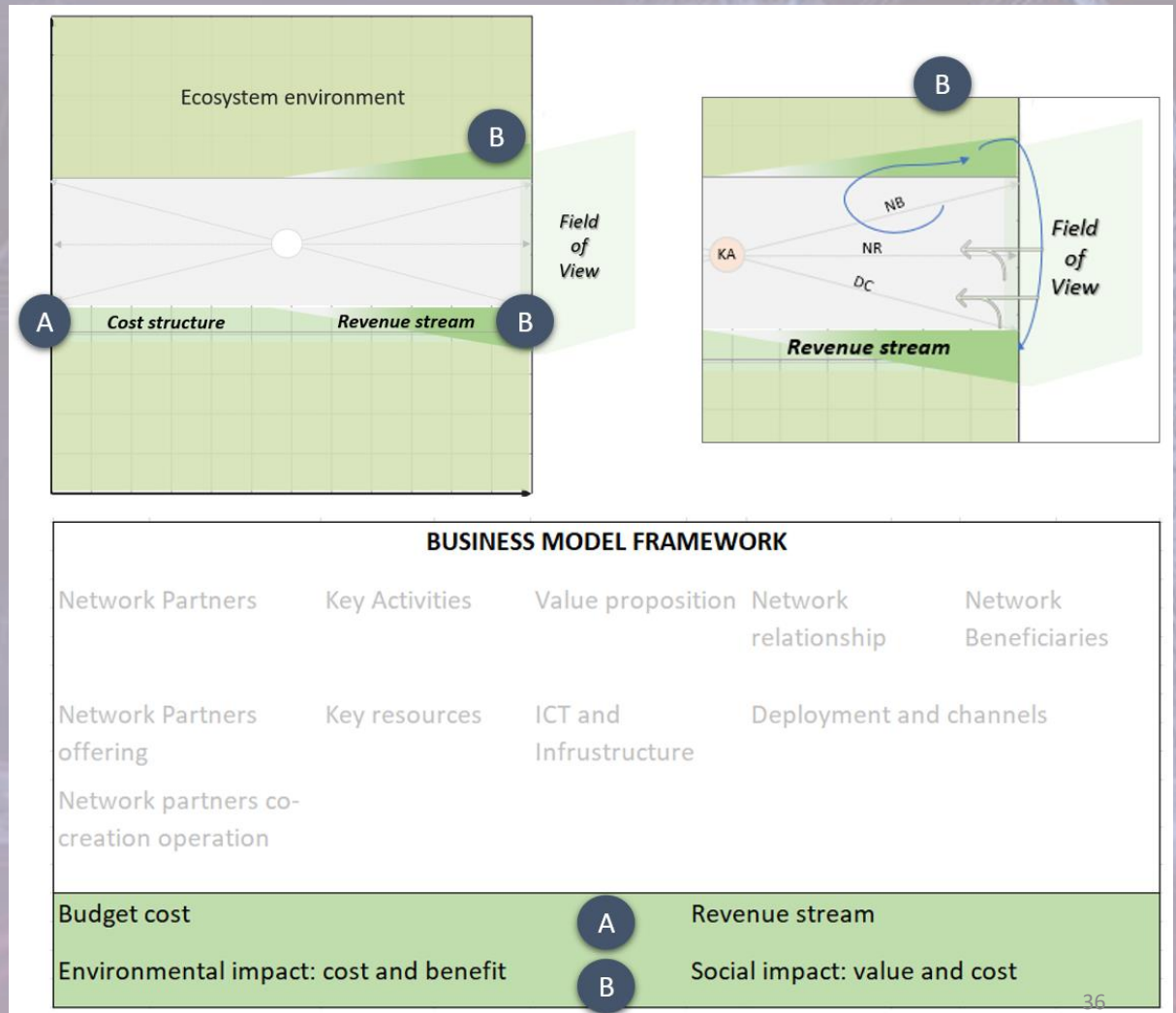
Evaluation framework for Smart Mobility Business Models

3 perspectives to look at:

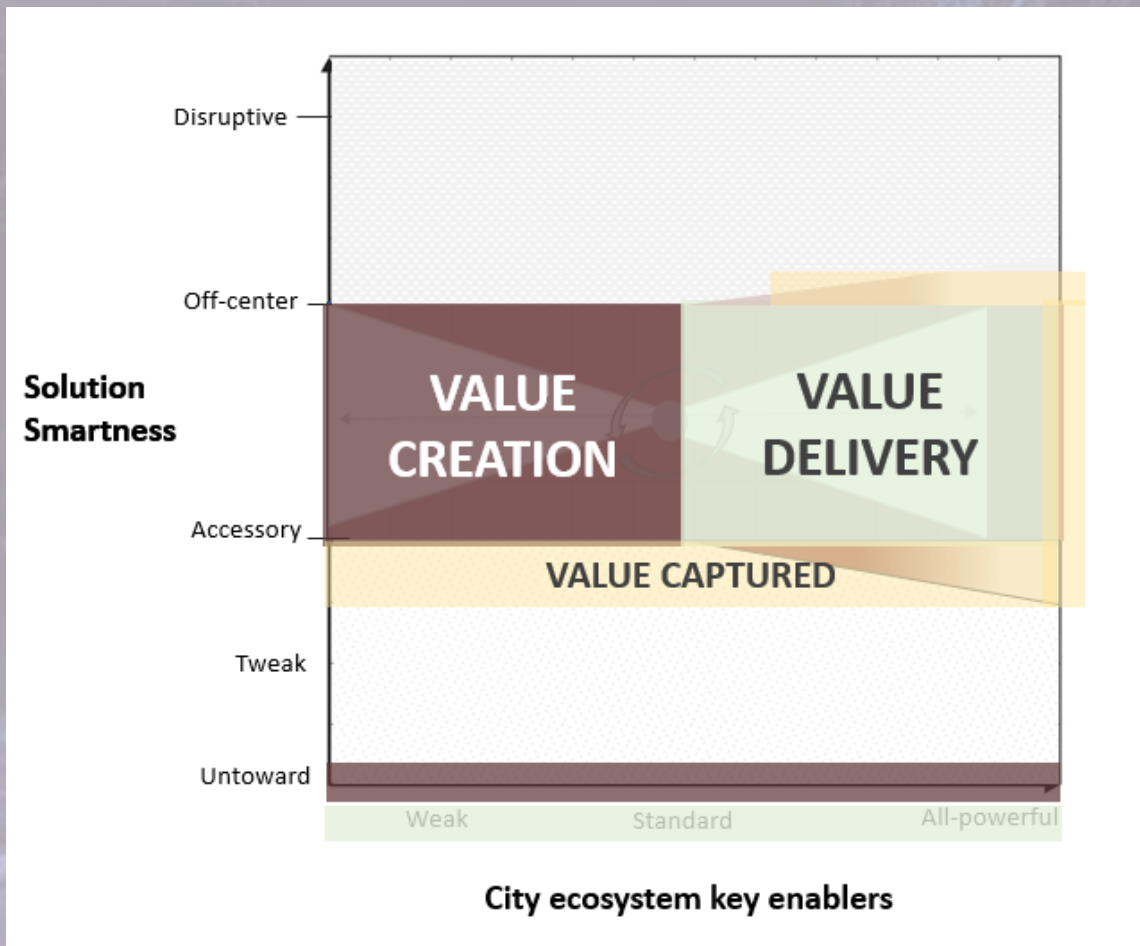
The smartness of the offering (Y)

The city ecosystem key enablers (X)

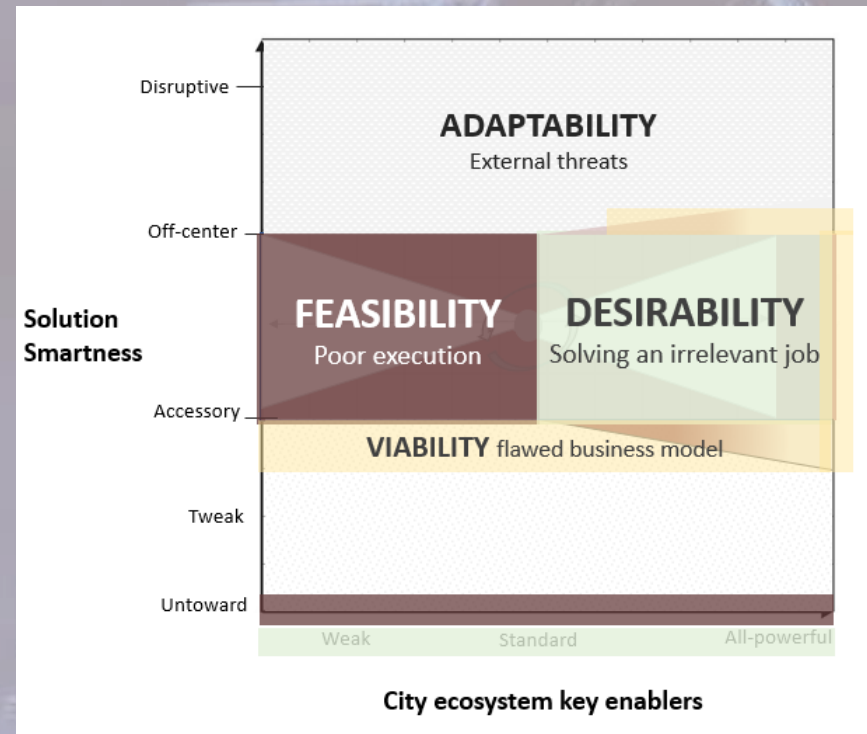
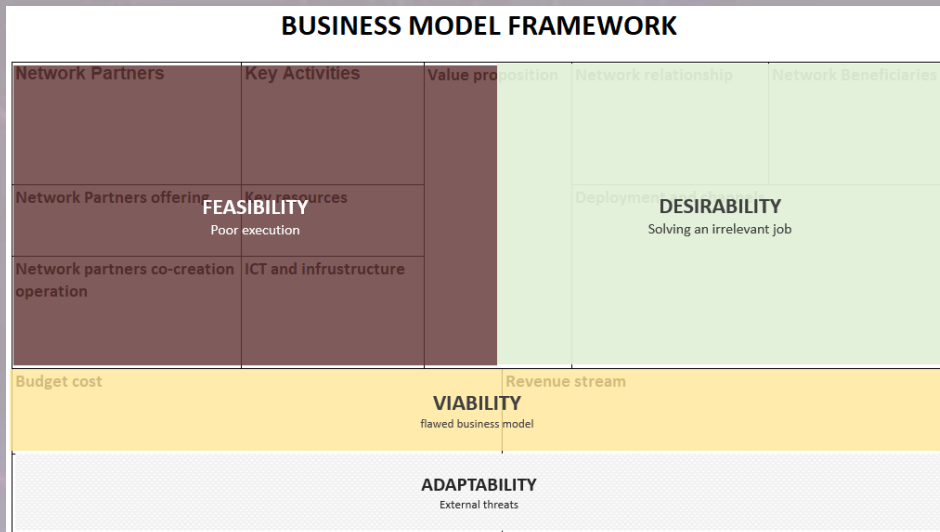
The feedback loop zone (F)



The value dynamics and risks in the Evaluation framework



The value dynamics and risks in the Evaluation framework





Part 4: Next steps

Some possible next steps

- Implementing the Business model blueprint for some on-going smart mobility projects in Norefjell
- Analysing the city eco-system, identifying current capabilities and gaps, and providing suggestions for improvement
- Evaluate existing and new smart city projects and initiatives against the ecosystem framework (to identify what is missing from the project plans and what is needed to make the projects fully successful).
- Ensuring Engagement of Stakeholders in Smart City Projects (Stake-holder analysis) and developing a stakeholder engagement plan



Thanks for your attention!

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