

Regional Workshop for Africa on
Developing the ICT ecosystem to harness Internet-of-Things (IoT)
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Business models of IoT: from suppliers to customer



Dr. Imen BEN CHAABANE

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Old business models

The basic business models that currently exist in the IoT and IIoT space are:

1. **Retail sales** : Equipment or device manufacturer expends its own money or raises financing to build products which are then sold to customers. The equipment or device manufacturer only captures value during that one transaction, the expectation is that there is a positive margin between revenue and expenses and that customers will buy more of the same product or other products.
2. **Product lease/Subscription** : Instead of selling the machine/device, the vendor leases the product to the customer.



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New models

It's imperative that new businesses and startups should explore new models for value creation and capture. The new business models will stem from the increased interactions afforded by IoT and IIoT (Industrial IoT) devices.

New models

Capturing value from human factors, analysis and machine interaction

An example will best serve here. Some business models can lie at the intersection of the 03 elements above.

There is a business model where a customer pays for insights drawn from the interactions. In the case of Proxxi the device keeps the technician safe by alerting him/her and the control room when unsafe conditions are detected.

We Call it : pay-per-warning.

Business Model for IoT

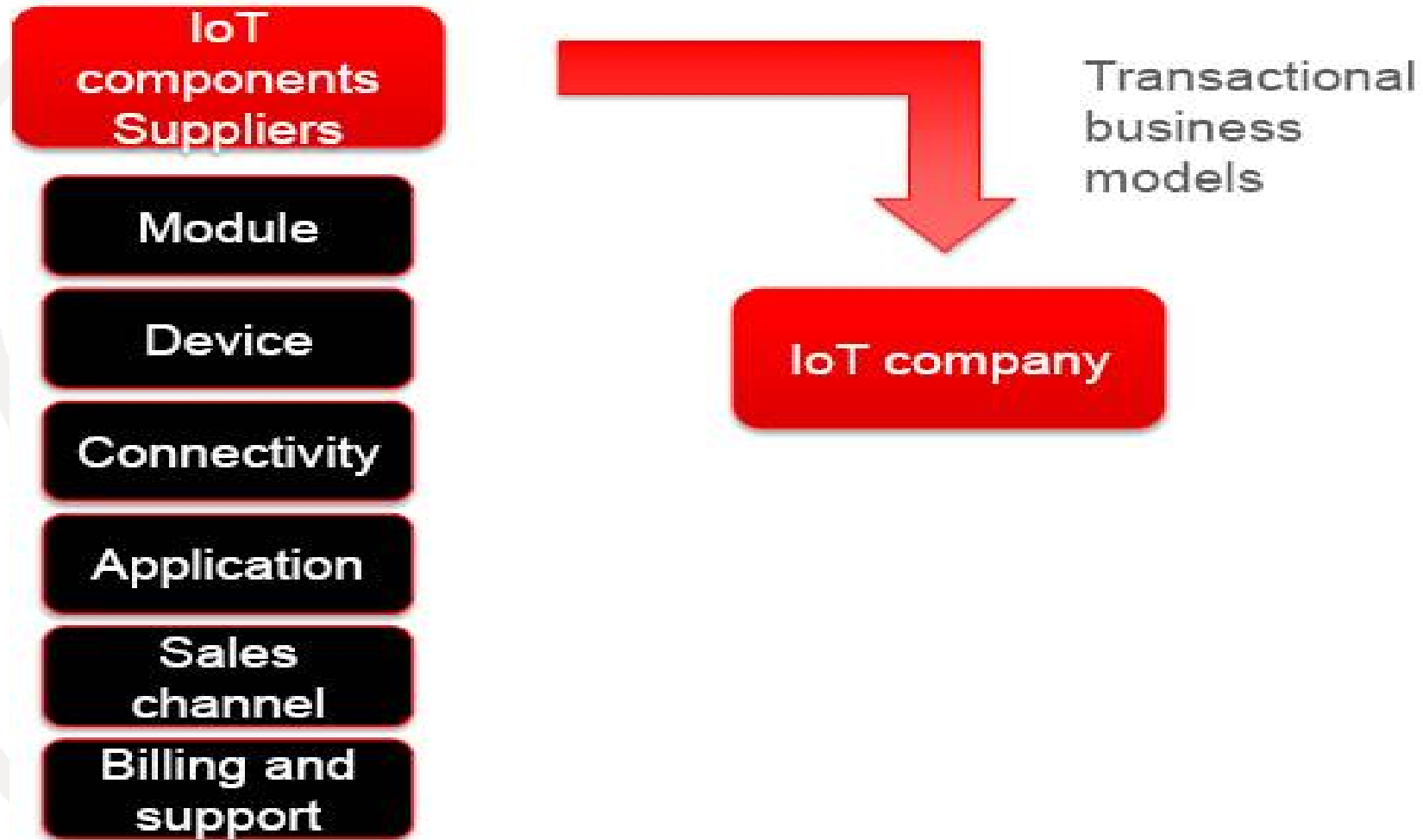
1

IoT can provide significant innovation in business models

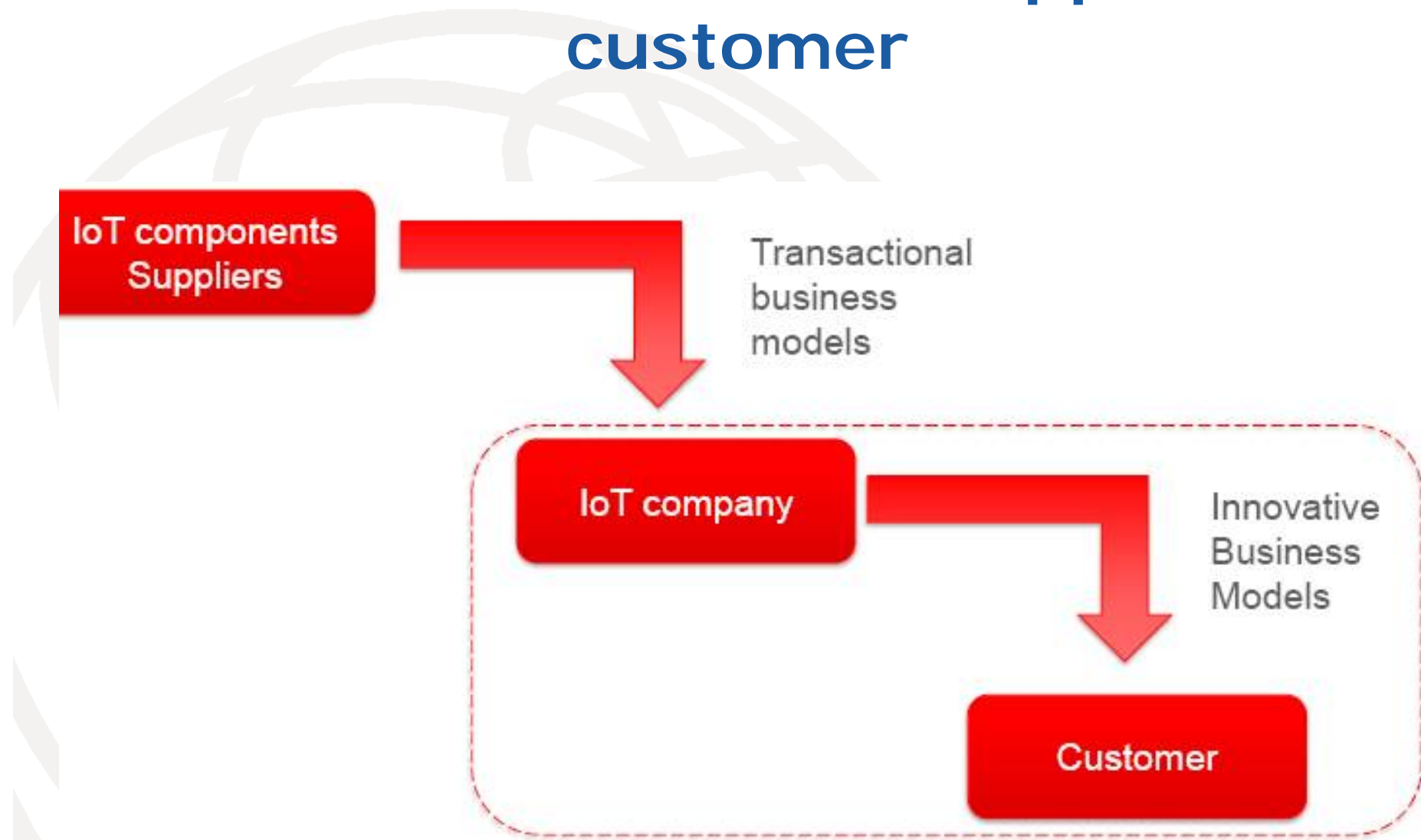
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Business model innovation will have most impact where the IoT company interacts with the customer

Business Model : from suppliers to customer

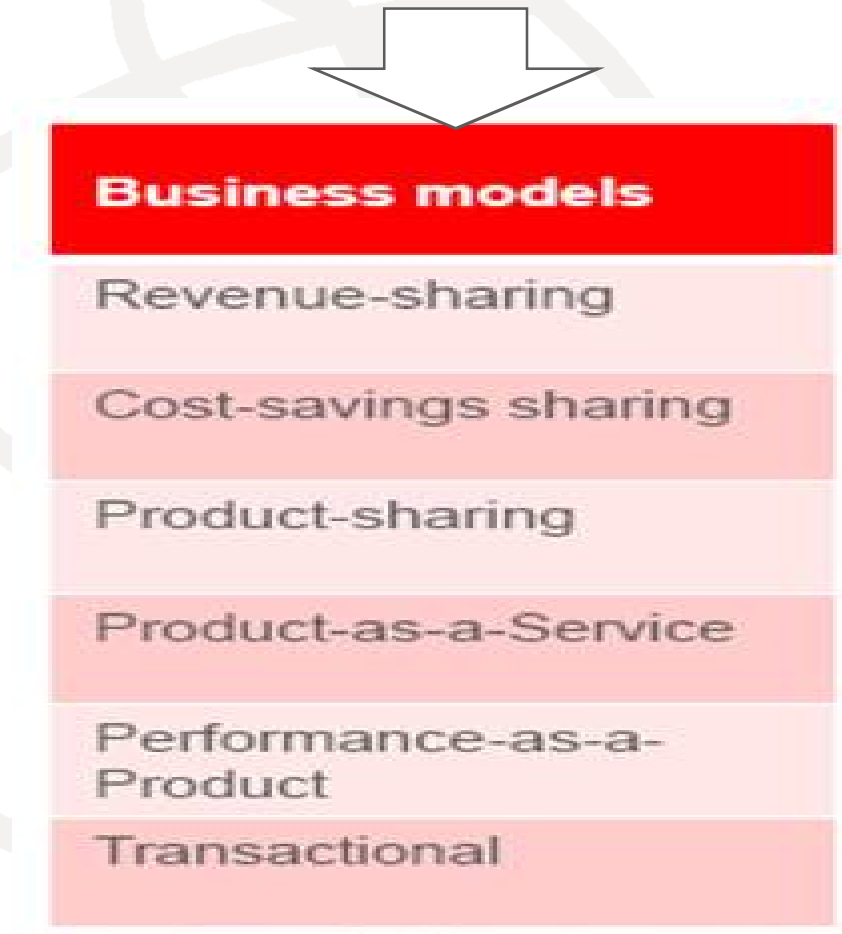


Business Model : from suppliers to customer



The main business Models

There are 5 main business models enabled by IoT between the IoT company and the customer ...



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The main business Models

...and can be compared in terms of revenue structure and device ownership

Business models	Revenue of the IoT company			Device ownership	
	Upfront	Recurring	Usage	User	IoT company
Revenue-sharing		✓			✓
Cost-savings sharing		✓			✓
Product-sharing			✓		✓
Product-as-a-Service		✓			✓
Performance-as-a-Product			✓	✓	
Transactional	✓			✓	

The descriptions above are the most common and variations are possible. For example, transactional may also include device ownership from the IoT company.

Revenue sharing

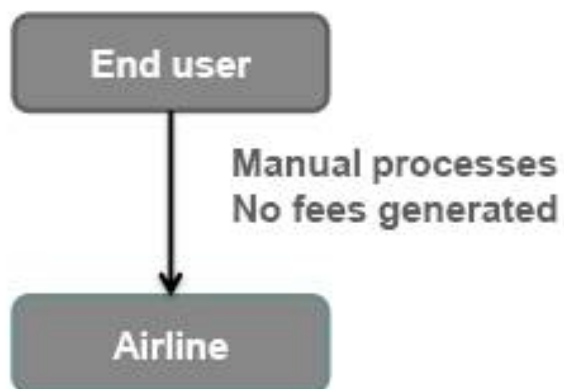
Tracking device



Problem	Luggage lost in air transit.
Traditional solution	<ul style="list-style-type: none">The airline would try to find the lost luggage using manual processes, which are costly, time consuming and generate customer dissatisfaction.
IoT solution	<ul style="list-style-type: none">A tracking device is placed inside the luggage and transmits its location using 2G. The user can track his luggage using a smartphone app.
IoT business model	<ul style="list-style-type: none">The airline charges a fee to its customers for using the luggage tracking service, or offers the service for no charge to premium customers. A share of the revenue generated is paid to the IoT company, which maintains the IoT solution.

Revenue sharing

Traditional business model



IoT business model



The IoT solution allows the airline to generate fees and differentiate its service

Costs savings sharing



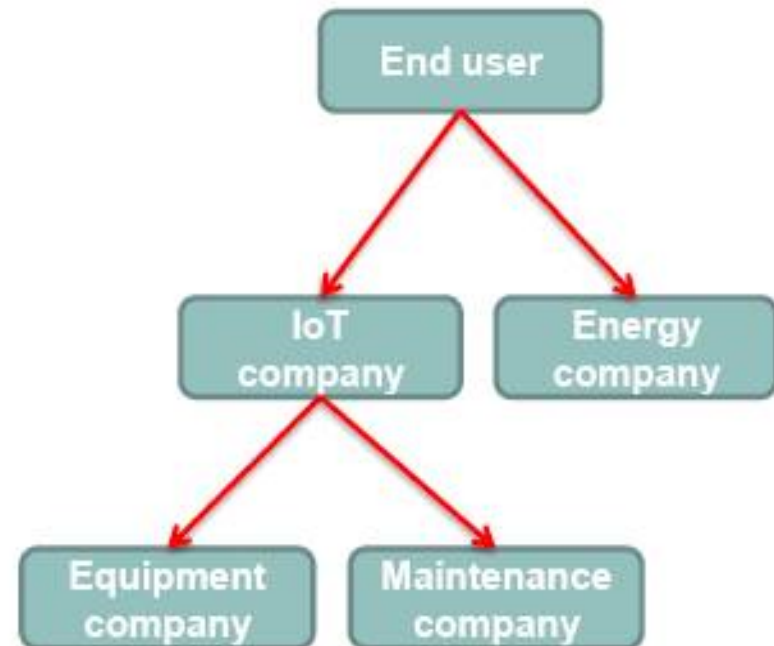
Problem	Home/building energy consumption.
Traditional solution	<ul style="list-style-type: none">The end user pays for the Heating, Ventilating and Air Conditioning (HVAC) system and its maintenance, and also pays the energy company for its power consumption.
IoT solution	<ul style="list-style-type: none">The end user installs equipment to monitor and control the HVAC system, so it can automatically adjust to the user's requirements and optimise its energy consumption.
IoT business model	<ul style="list-style-type: none">The IoT company installs the monitoring and control equipment with no up-front fees.The end user pays for the equipment rental from the energy savings generated by the IoT solution. If the savings amount to \$100 and the rental is \$40, the end user keeps \$60 as overall savings.

Costs savings sharing

Traditional business model



IoT business model



The IoT solution allows end users to save on their energy consumption costs and use part of the savings to pay for the IoT solution

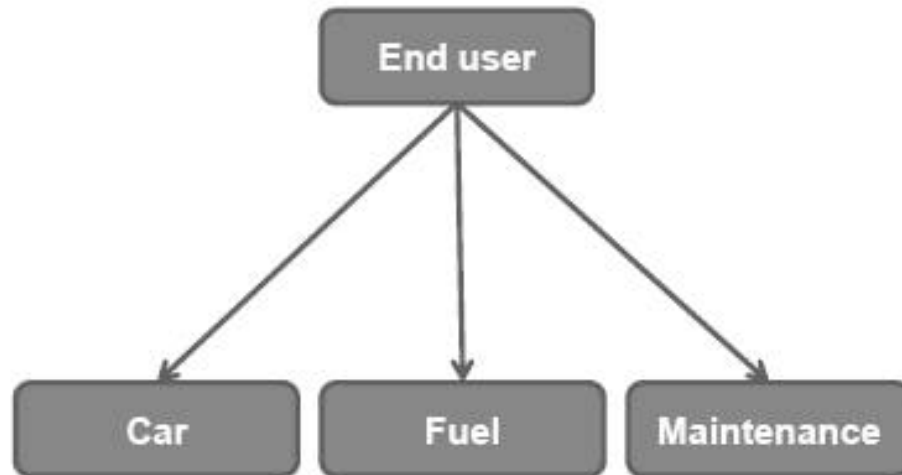
Product - sharing



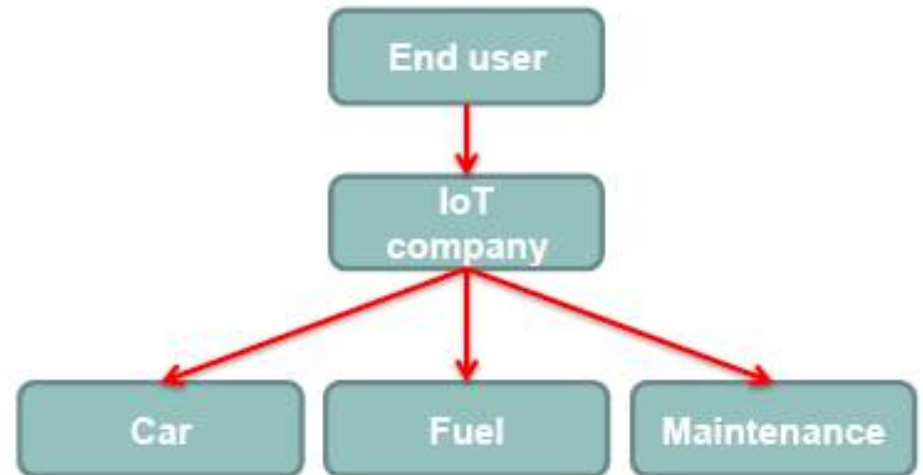
Problem	Relatively high investment and maintenance costs of a car.
Traditional solution	<ul style="list-style-type: none">The end user buys the car upfront and pays for its ongoing maintenance, fuel and insurance.
IoT solution	<ul style="list-style-type: none">The end user can drive a number of cars made available across a city, without needing to own one.All car related costs are managed by the IoT company. A smartphone app, allows users to reserve the car, locate and unlock it.
IoT business model	<ul style="list-style-type: none">The IoT company charges end users by the minute for using a car. The fees include the cost of the car, its maintenance, fuel and insurance.From managing a large fleet of vehicles, the IoT company can achieve economies of scale, which can be translated into competitive prices for the end user.

Product - sharing

Traditional business model



IoT business model



The IoT business model allows the IoT company to transfer savings from economies of scale to the end user

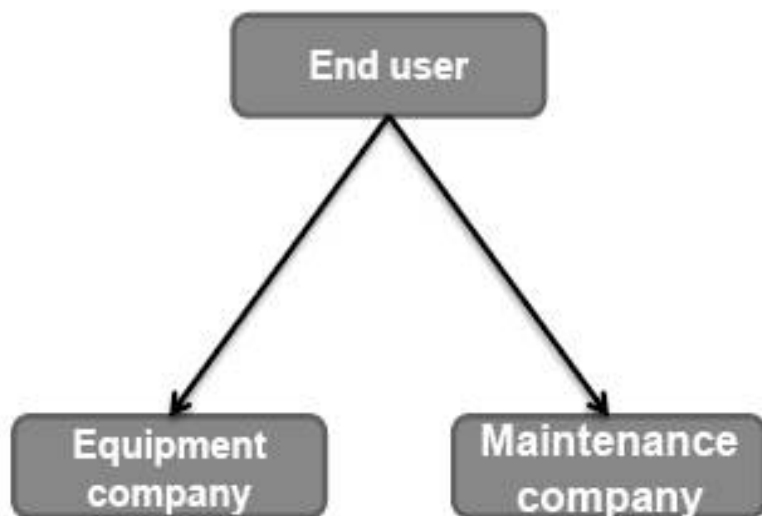
Product-as-a-Service



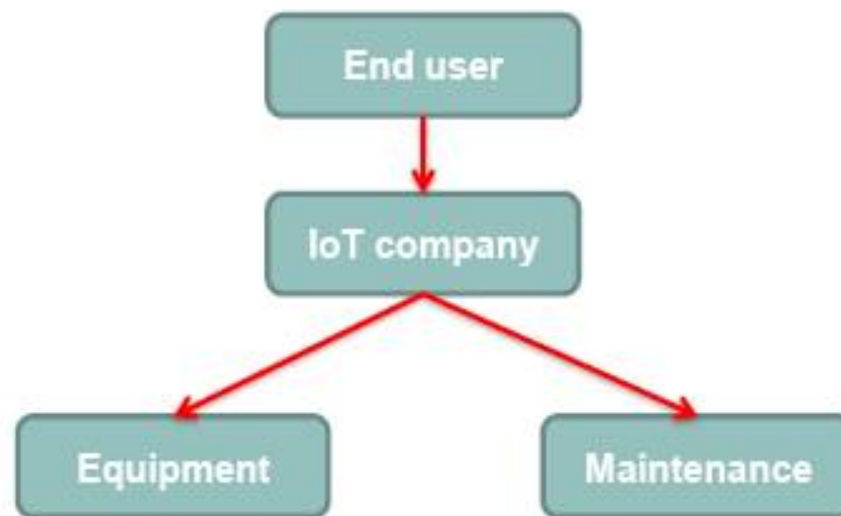
Problem	High investment and maintenance cost of heavy medical equipment.
Traditional solution	<ul style="list-style-type: none">The user (e.g. hospital) buys the equipment upfront and can face high maintenance costs. Different suppliers may be involved in selling and supporting the equipment.
IoT solution	<ul style="list-style-type: none">The hospital pays for the equipment and maintenance to the IoT company.The equipment is remotely monitored in terms of usage and performance, allowing the IoT company to perform predictive maintenance. As a result, the end user can benefit from reduced or no disruption from equipment downtime.
IoT business model	<ul style="list-style-type: none">The IoT company charges a recurring fee to the hospital. This fee includes the use of the equipment and its maintenance.The equipment is owned by the IoT company, who by actively monitoring it, may pre-empt potentially serious issues resulting in expensive maintenance.

Product-as-a-Service

Traditional business model



IoT business model



The IoT solution can perform predictive maintenance, allowing the end user to benefit from lower or no disruption and more affordable cost

Performance-as-a-product



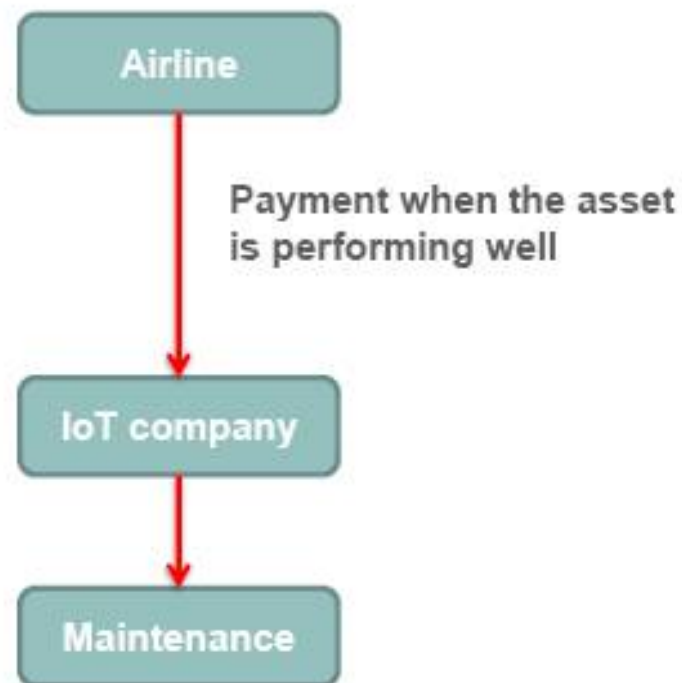
Problem	Uncertain aircraft engine maintenance cost.
Traditional solution	<ul style="list-style-type: none">Airlines would buy the engine from manufacturers such as Rolls-Royce and take on the risk of the engine becoming inoperable and possible high maintenance cost.
IoT solution	<ul style="list-style-type: none">The aircraft engines have embedded sensors that send data back to the engine manufacturer (IoT company).This information is used by the IoT company to identify and fix problems remotely, minimising the risk of engine downtime.
IoT business model	<ul style="list-style-type: none">Rolls-Royce's TotalCare program is sold to airlines as a solution to make the engine's maintenance costs predictable.Under this program, Rolls-Royce is responsible for the engine's maintenance and only gets paid if the engine is operational. Its revenues equal a fixed fee per flying hour.

Performance-as-a-product

Traditional business model



IoT business model



The IoT solution aligns the interests of the airline with the maintenance provider

Summary : business models

1

IoT can provide significant innovation in business models

2

Business model innovation will mostly impact where the IoT company interacts with the end user

Case study 1 : Farm water monitoring

Problem: How do I know if my water tanks need to be refilled?

Customers

- Farmers

Needs to address

- Water availability for animals. This is particularly relevant in dry lands (e.g. certain areas of Africa)



Case study 1 : Farm water monitoring

IoT solution & benefits

IoT solution

- A sensor is placed in the water tanks and troughs to monitor the water level sending an alert to the controlling station (or via SMS text or email) if water levels flow or pressures go outside a pre-configured range

Benefits

- The solution increases the efficiency in the water usage, which can be particularly important in developing countries and in dry lands



Case study 1 : Farm water monitoring

Technologies

Feature	Requirement	Comment
Network Area	▪ Wide	Extended fields in remote locations can require significant signal coverage
Spectrum	▪ Shared / Dedicated	Quality of service of transmission is not a crucial factor
Battery life	▪ Long	The sensors may be placed in remote points of the field and need to have long battery life. Solar panels may contribute to extending battery life
Connectivity cost	▪ Low	Associated to the low bandwidth requirement
Module cost	▪ Medium	Price may be an issue in developing countries
Bandwidth	▪ Low	Data needed to monitor water level is limited

Technologies:

LPWA

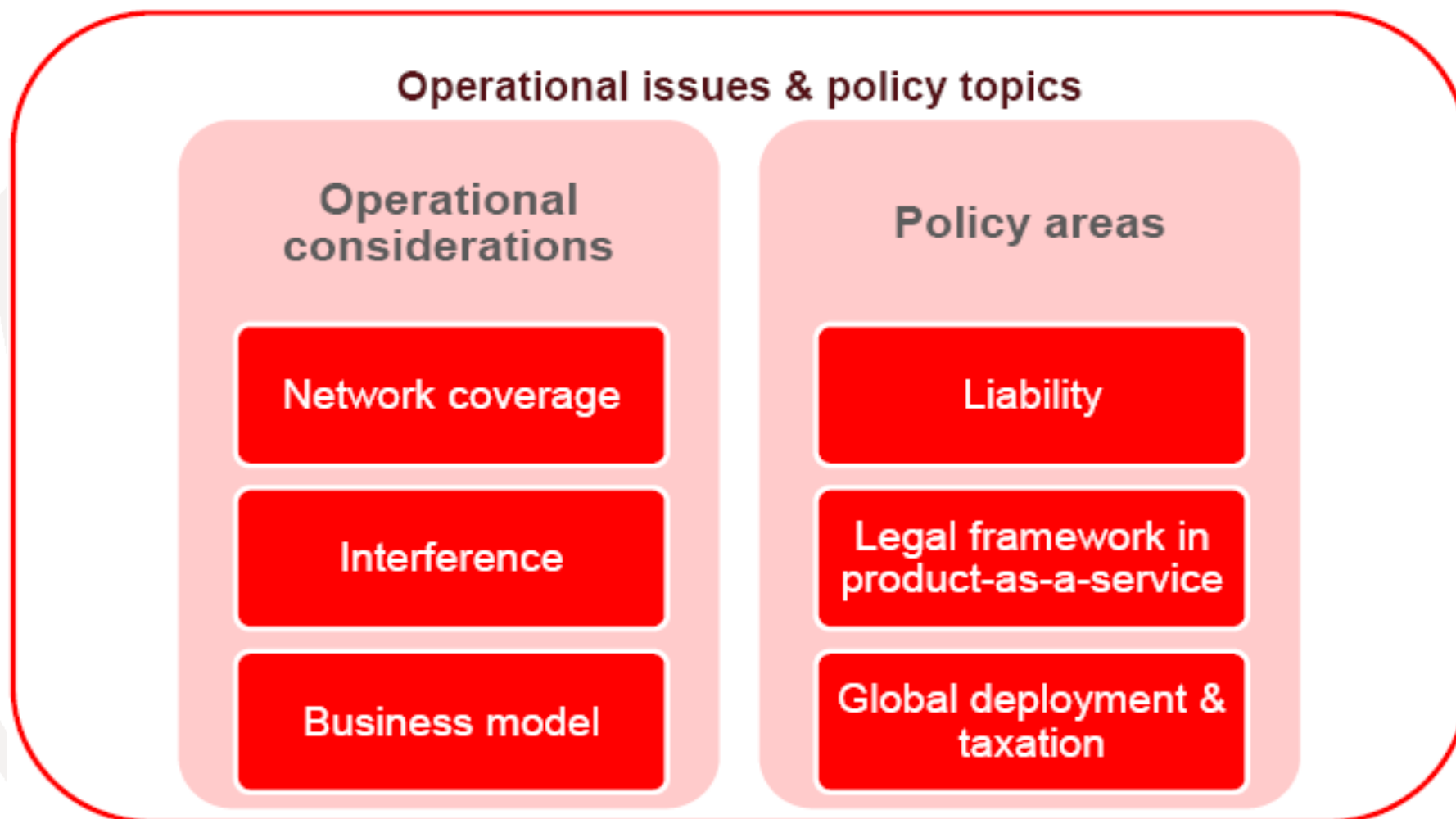
2G

Farm water monitoring – most likely business models

Business models	Revenue of the IoT company	Device ownership
Revenue-sharing	Recurring	IoT company
Cost-savings sharing	Recurring	IoT company
Product-sharing	Usage	IoT company
Product-as-a-Service	Recurring	IoT company
Performance-as-a-Product	Usage	User
Transactional	Upfront	User

Most likely business models

Farm water monitoring



Liability

Liability

- Establishing responsibility needs to be clear in the event of damages resulting from the IoT solution
- If the solution fails and animals die because of lack of water, who is to blame:
 - The local reseller installer?
 - The IoT technology company?
 - The network operator?
 - The farmer?

Case of study 2 : Elderly care monitoring

Problem: How can I monitor an elderly family member?

Customers

- People with elderly family

Needs to address

- Monitoring the activity of the elder
- Alert if the activity significantly changes from what is expected



Case of study 2 : Elderly care monitoring

IoT solution & benefits

IoT solution

- Movement sensors are placed around the home, transmitting data on activity (e.g. doors, people)
- The sensors are connected to a hub that sends data to an application, using cellular connectivity

Benefits

- The monitoring system can reduce family members' anxiety regarding the well being of their elderly relative
- Elderly can continue living in their homes, avoiding being taken to a care home



Case of study 2 : Elderly care monitoring

Technologies

Feature	Requirement	Comment
Network Area	▪ Wide	The hub sending data to an application uses cellular connectivity, so requires wide network area
Spectrum	▪ Dedicated	The connectivity service should be reliable
Battery life	▪ Low	The hub is plugged in to an electrical outlet
Connectivity cost	▪ Medium	Price sensitivity will vary by person/country. We assume the price will need to be moderate
Module cost	▪ Medium	Again, price sensitivity will vary but we assume it will need to be moderate
Bandwidth	▪ Low	The application requires low bandwidth

Technologies:

2G

?

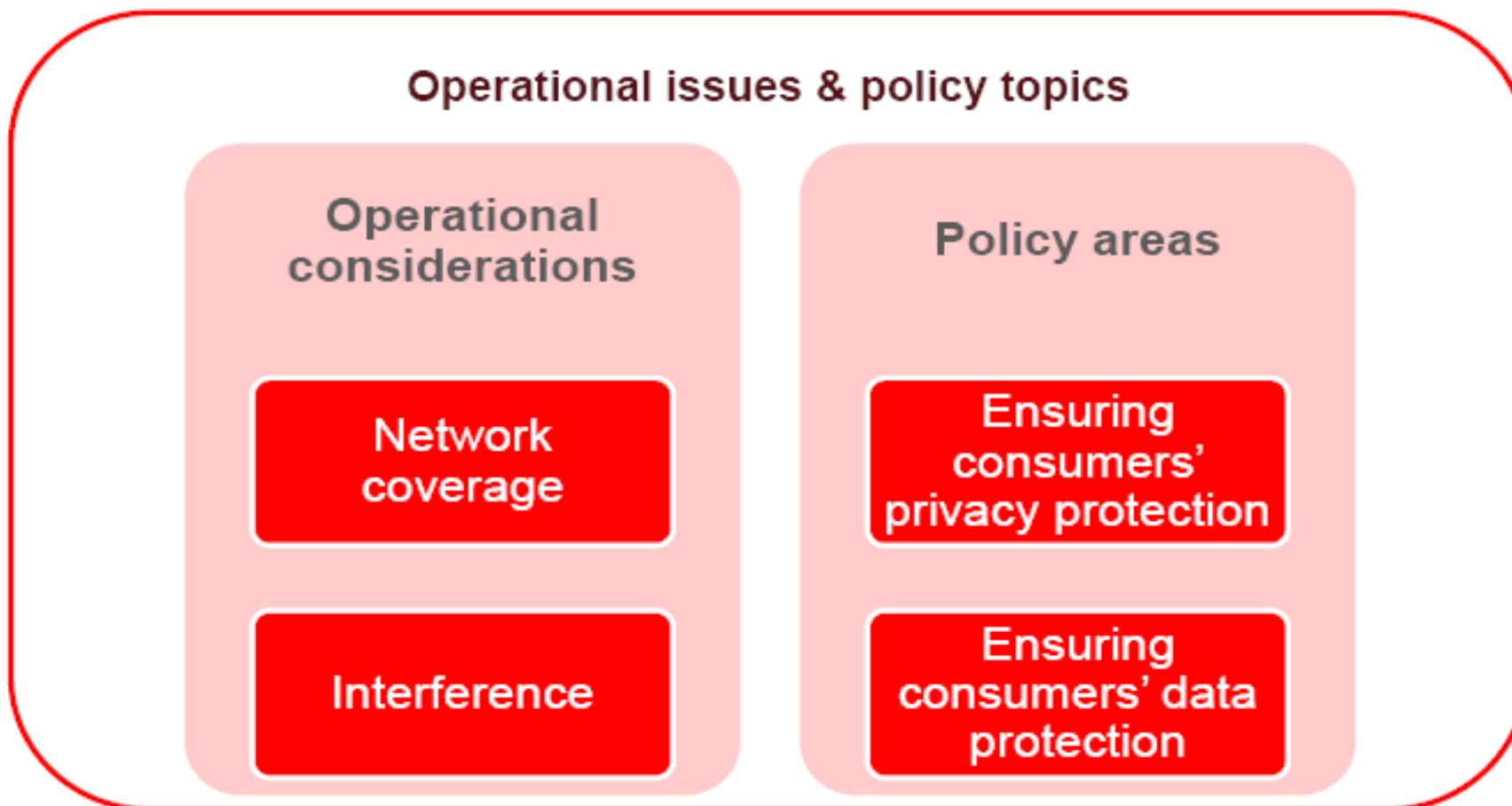
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Elderly care monitoring-most likely business models

Business models	Revenue of the IoT company	Device ownership
Revenue-sharing	Recurring	IoT company
Cost-savings sharing	Recurring	IoT company
Product-sharing	Usage	IoT company
Product-as-a-Service	Recurring	IoT company
Performance-as-a-Product	Usage	User
Transactional	Upfront	User

Most likely business models

Elderly care monitoring



Privacy and data protection

Data collection

- Who collects, shares and uses the individuals' data and why?

Data protection

- How is the security of individuals' data ensured?
- How is the privacy of individuals' data ensured?

Data use

- How can individuals exercise choice and control over how their data will be used?

Case study 3 : smart public garbage bin

Problem: How can you improve the efficiency of waste collection in cities?

Customers

- Cities and towns

Needs to address

- Improve the public waste collection service
- Save costs on public waste management by making the service more efficient



Case study 3 : smart public garbage bin

IoT solution & benefits

IoT solution

- The smart garbage bin monitors and reports the bins status, alerting when it needs to be emptied
- The solutions help optimise waste collection (i.e., only emptying bins when necessary)

Benefits

- Pollution is reduced as bins are never full and traffic on the roads is reduced
- Taxes can be spent more efficiently



Case study 3 : smart public garbage bin

Technologies

Feature	Requirement	Comment
Network Area	▪ Wide	The bins are located community-wide or city-wide
Spectrum	▪ Shared / Dedicated	Quality of service (timeliness) of transmission is not a crucial factor
Battery life	▪ Long	Battery life has to be long, but use of solar panels may help widen the battery life
Connectivity cost	▪ Low	Expected to be low and in line with bandwidth requirements
Module cost	▪ Low	The cost per bin needs to be low so it is feasible to deploy across all bins in a given community/city. Bins are exposed and easily subject to theft.
Bandwidth	▪ Low	The application requires low bandwidth

Technologies:

LPWA

2G

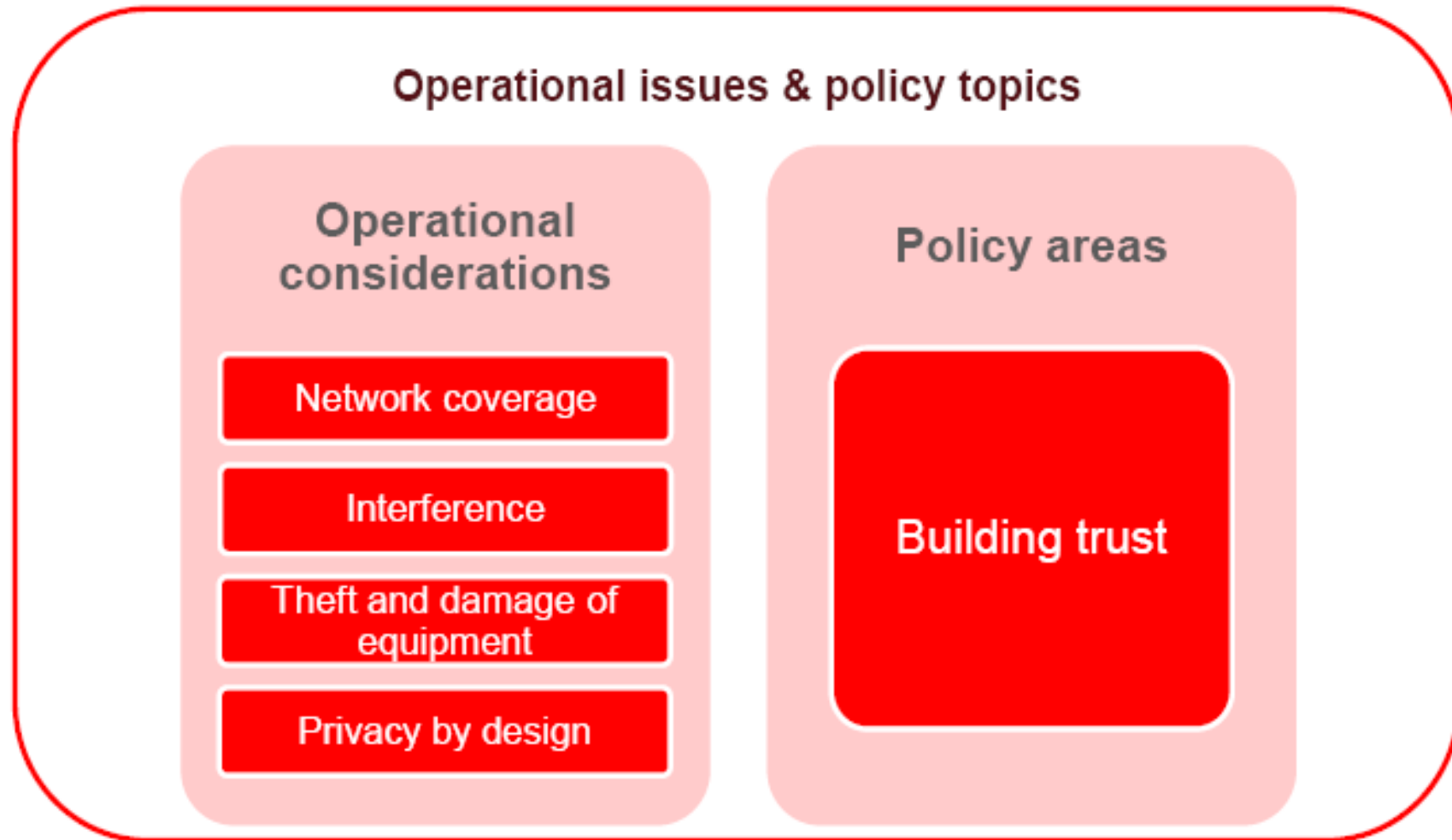
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Smart public garbage bin-Most likely business models

Business models	Revenue of the IoT company	Device ownership
Revenue-sharing	Recurring	IoT company
Cost-savings sharing	Recurring	IoT company
Product-sharing	Usage	IoT company
Product-as-a-Service	Recurring	IoT company
Performance-as-a-Product	Usage	User
Transactional	Upfront	User

Most likely business models

Smart public garbage bin



Smart public garbage bin

Privacy

Data collection

- Regulators should support and encourage measures by which industry can identify and mitigate risks to privacy, and through which they can demonstrate accountability.
- This objective can be achieved through privacy enhancing technologies and tools that help consumers to manage their privacy and control how their data are used.

- In 2013, the City of London fitted devices in recycling bins to collect data on footfall.
- The data was collected by logging the media access control (MAC) of passing phones and done without the knowledge of those individuals.
- European Union regulation forbids mining personal data using 'cookies', which involves installing a monitoring device on individuals' phones or computers. However, tracking MAC codes leaves no trace on phones.

Case study 4 : Security alarms

Problem: How can I keep my home protected?

Customers

- Property owners

Needs to address

- Alert the police and property owner in case of intrusion
- The system needs to be able to work without a local power source or fixed connectivity



Case study 4 : Security alarms

IoT solution & benefits

IoT solution

- Sensors are spread around the property to detect motion and sound
- When a sensor is activated, it sends an alert to property owner and/or control centre, who can warn the police
- The security system can be monitored and armed/disarmed using a smartphone app or web interface

Benefits

- Reductions of crime. The dissuasive effect of the alarm system can help reduce chances of a break in
- Reduction of negative outcome from break-in, due to early dispatch of police and system's ability to operate without fixed line connection and local power source



Case study 4 : Security alarms

Technologies

Feature	Requirement	Comment
Network Area	<ul style="list-style-type: none">▪ Wide	The area to be covered is indoors and needs to operate without fixed line
Spectrum	<ul style="list-style-type: none">▪ Dedicated▪ Shared	Ideally, the service would have some quality guarantee, but it could also work in shared spectrum
Battery life	<ul style="list-style-type: none">▪ Short	Battery life can be short as the alarm can be connected to a local power source
Connectivity cost	<ul style="list-style-type: none">▪ Low	The cost is expected to account for a relatively low amount of the security alarm system's recurring fee
Module cost	<ul style="list-style-type: none">▪ Medium	The cost is expected to account for a relatively low amount of the security alarm system's cost
Bandwidth	<ul style="list-style-type: none">▪ Low	The application requires low bandwidth

Technologies:

2G

ZigBee

RF-Mesh

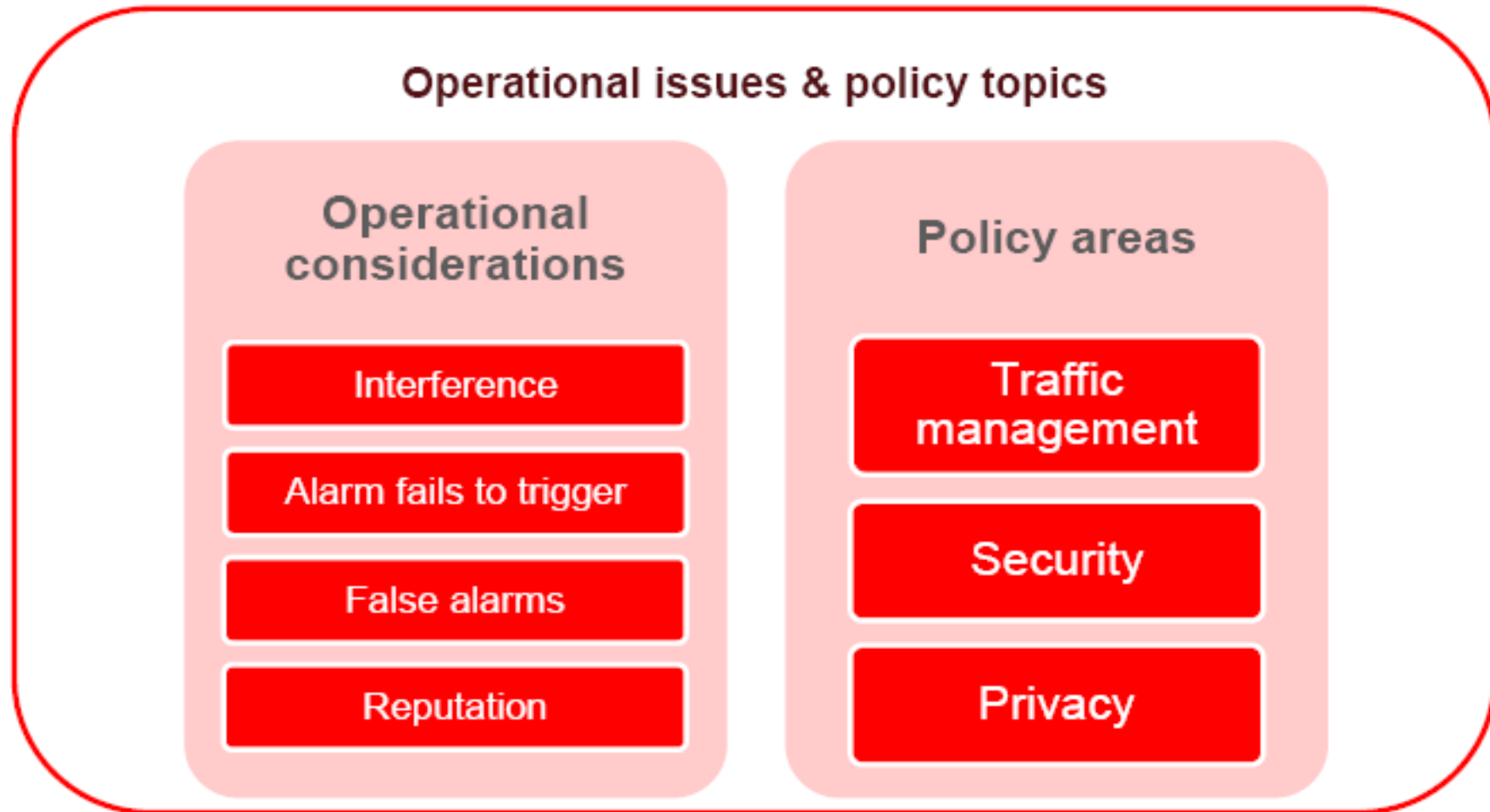
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Security alarms-Most likely business models

Business models	Revenue of the IoT company	Device ownership
Revenue-sharing	Recurring	IoT company
Cost-savings sharing	Recurring	IoT company
Product-sharing	Usage	IoT company
Product-as-a-Service	Recurring	IoT company
Performance-as-a-Product	Usage	User
Transactional	Upfront	User

Most likely business models

Case study 4 : Security alarms



Traffic Management


Traffic prioritisation


- For IoT applications related to mission-critical services, operators may need to prioritise traffic.


QoS classification


- It is important to define IoT applications by QoS class and perform traffic management based on that.


Example of commercial Model

Society	Radio Protocol	Coverage	Customer Target	Network Flow	Price / Commercial Model
	<p>UNB (Ultra Narrow Band) with proprietary radio communication protocol layer. Objects can be addressed with standard protocols from the Internet: HTTP (S) and MOU as well as the ability to create IP addresses for each object.</p>	<p>Five countries covered (France, Spain, United Kingdom, Portugal, Netherlands) and seven countries in the process of deployment (Belgium, Denmark, Luxembourg, Czech Republic, Italy, Ireland and the United States). Target of 60 countries covered by 2017.</p>	<p>Sigfox offers to any company, from start-up to large account, who wants to develop connected B2C or B2B solutions. Business sectors: emergency and security services, intelligent buildings, automotive, transportation.</p>	<p>100 bits per second - Upstream: Each device can send between zero and 140 messages per day and each message can contain up to 12 bytes of data - Downlink: up to 4 messages per day per object.</p>	<p>Offer by subscription integrating communications and additional services including consulting and development. Price: from 1 to 8 E / object per year, depending on the volume of messages exchanged by the devices and the number of connected devices.</p>

Society	Radio Protocol	Coverage	Customer Target	Network Flow	Price / Commercial Model
	<p>LoRaWAN with Live Objects, a data management platform integrating an H11P type API (object registration, sending of commands, etc.) and an MQTT-type API (receiving messages from connected objects to the client application server).</p>	<p>17 agglomerations in the first quarter of 2016 (Angers, Avignon, Bordeaux, Douai and Lens, Grenoble, Lille, Lyon, Marseille, Montpellier, Nantes, Nice, Paris, Rennes, Of French territory.</p>	<p>Companies of all sizes, ranging from start-ups to SMEs, to large companies. The main sectors or sectors concerned are: smart cities (including smart buildings), energy, industry, logistics and health.</p>	<p>Companies of all sizes, ranging from start-ups to SMEs, to large companies. The main sectors or sectors concerned are: smart cities (including smart buildings), energy, industry, logistics and health.</p>	<p>In addition to its offerings of Machine to Machine connectivity, Orange will offer LoRa connectivity offers whose prices will depend on the number of objects to be connected, the associated services and, with a subscription model per object.</p>

Society	Radio Protocol	Coverage	Customer Target	Network Flow	Price / Commercial Model
	<p>LoRaWAN with data management platform with standard-compliant architecture OneM2M integrates several protocols for the transfer of data including the MOU protocol as well as REST-type APIs.</p>	<p>The network deployed by Bouygues Telecom will cover 50% of the population in the summer of 2016 and the entire territory at the end of 2016.</p>	<p>Large accounts, SMEs, start-ups or administrations. All types of B2C projects like B2B, from the simple request of connectivity to the complete project with storage and processing of the data for a business use (energy, transport, localization ...)</p>	<p>Network based on LoRaWAN technology that allows variable data rates ranging from 0.3 kbps to 50 kbps in both uplink and downlink channels.</p>	<p>Subscription per object connected to the network with a price ranging from 1 € per month to 1 € per year depending on the quantity of objects.</p>

Society	Radio Protocol	Coverage	Customer Target	Network Flow	Price / Commercial Model
	<p>UNB-LoRa bi-mode network, with proprietary radio communication protocol layer on the UNB part. No further information available.</p>	<p>18 private networks deployed around the world. The first public network to be deployed in France on TDF's infrastructure (10,000 sites for radio equipment and television). Objective: to cover 100% of cities with more than 10000 inhabitants by 2016.</p>	<p>Future: any company that wishes to add value to its customers by taking advantage of the IoT But initially: positioning mainly on SME projects and start-ups.</p>	<p>No information at this time.</p>	<p>No information at this time.</p>

Society	Radio Protocol	Coverage	Customer Target	Network Flow	Price / Commercial Model
	LoRaWAN with HTTP (S) and MQTT	Several European cities from September and the main European cities before the end of 2016.	Companies and individuals. No further information available.	Network based on LoRaqui technology allows variable data rates ranging from 0.3 kbps to 50kbps in both uplink and downlink channels.	Prices not finalized. Starting at 50 cents per connected object per year.



1. IoT has opened up limitless possibilities for businesses and brands as they seek to build novel connections to their customers
2. While Business-to-Consumer (B2C) use cases seem to corner most of the attention, mass adoption of IoT in the B2C arena has run into its own set of challenges. Affordability is a concern.
3. B2B use cases are already popular and growing more so by the day. Companies are using IoT to connect to their customers, suppliers and vendors in a big way.
4. Be it B2B, B2C or B2B2C, the main challenge facing IoT adoption is in finding successful use case studies that can be replicated by the industry.
5. Moving the IoT industry from early adopters to mass market will depend on applications of the technology, rather than the technology itself.

THE INTERNET OF THINGS REQUIRES A MINDSET SHIFT

Because you'll create and capture value differently.

		TRADITIONAL PRODUCT MINDSET	INTERNET OF THINGS MINDSET
VALUE CREATION	Customer needs	Solve for existing needs and lifestyle in a reactive manner	Address real-time and emergent needs in a predictive manner
	Offering	Stand alone product that becomes obsolete over time	Product refreshes through over-the-air updates and has synergy value
	Role of data	Single point data is used for future product requirements	Information convergence creates the experience for current products and enables services
VALUE CAPTURE	Path to profit	Sell the next product or device	Enable recurring revenue
	Control points	Potentially includes commodity advantages, IP ownership, & brand	Adds personalization and context; network effects between products
	Capability development	Leverage core competencies, existing resources & processes	Understand how other ecosystem partners make money

SOURCE SMART DESIGN

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conclusion

1. While the personal connected device/IoT market seems to be struggling right now, there is some value to be created and captured as the industry matures and better use cases are defined.
2. On the other hand, the IIoT space is seeing a convergence in interest from the customers and clear use cases that provide value.



Thanks for your attention

Imen BEN CHAABANE
Email : benchaab@ties.itu.int

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