RENAS

RedoIT: A scalable pilot project for recycling electronics

Sapphire Consulting
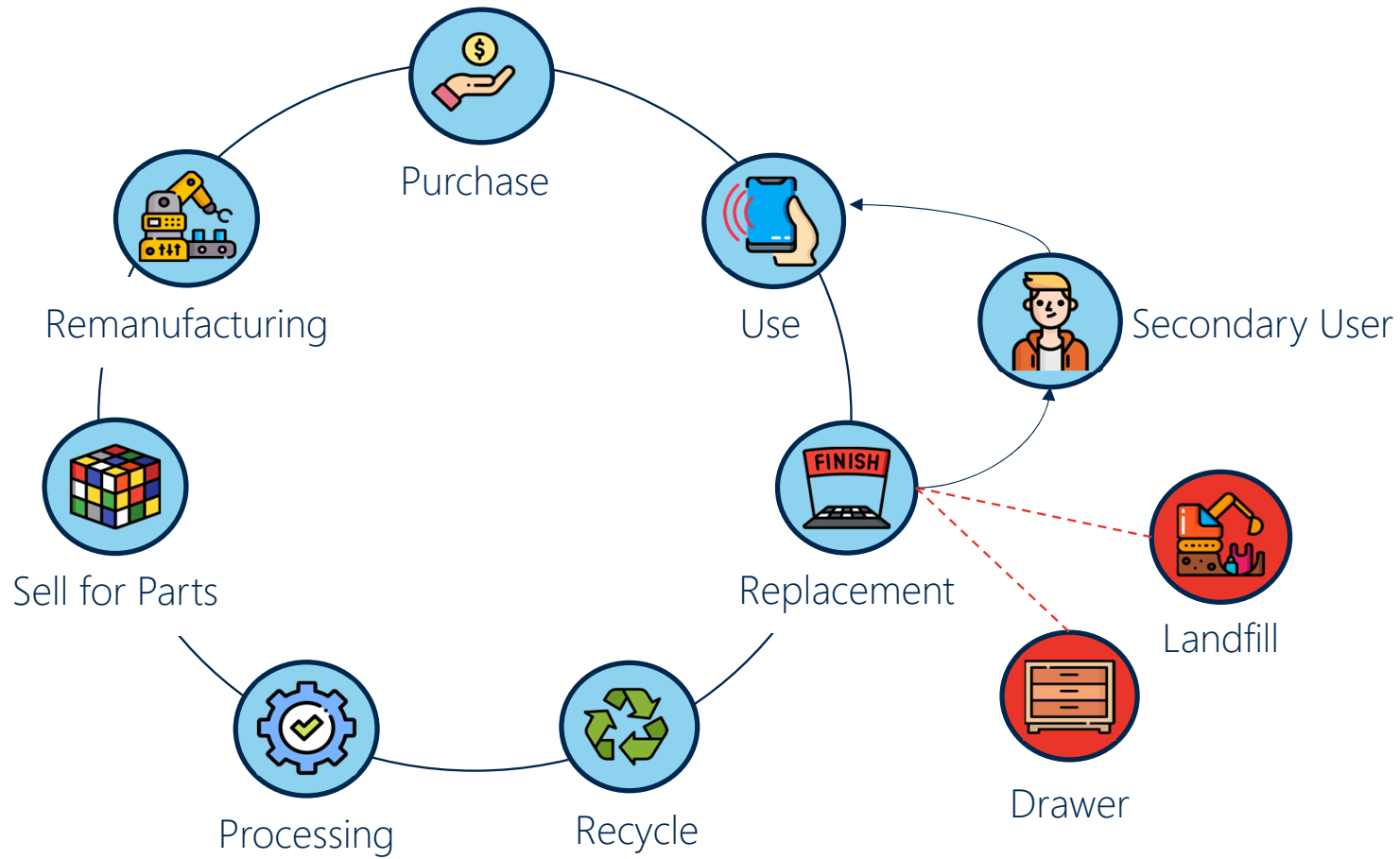
Nicholas Chan, Mark Laufert, Angela Tan, Langni Zeng

Tasks

Develop a pilot project for RedoIT that encourages and allows consumers and small businesses to recycle electronic devices containing sensitive information.

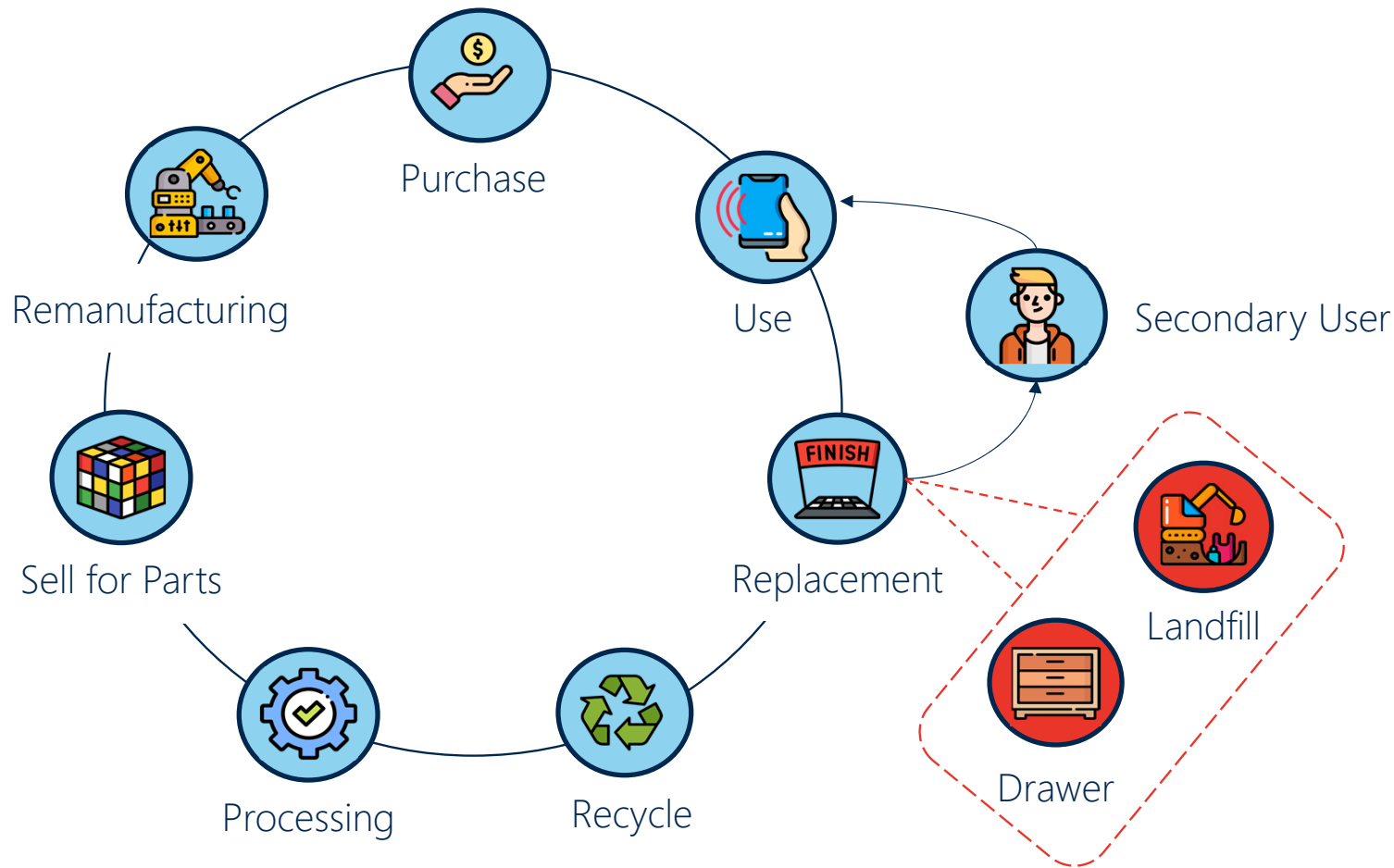Define how this pilot can be scaled nationally.

RENAS has established the infrastructure needed to facilitate a circular economy

Purchase

Remanufacturing

Use

Secondary User

Sell for Parts

Replacement

Landfill

Processing

Recycle

Drawer

RENAS

Many personal devices still follow a linear path to landfills or drawers

Purchase

Remanufacturing

Use

Secondary User

Sell for Parts

Replacement

Processing

Recycle

Landfill

Drawer

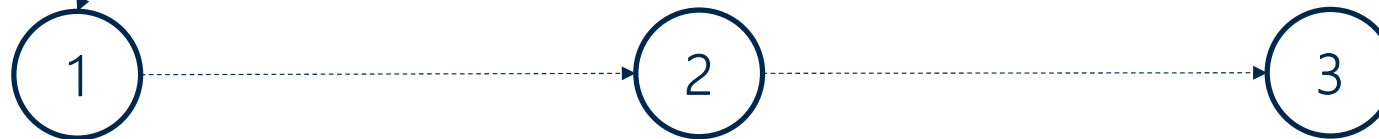**~50%** of Norwegian electronic waste is not recycled

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Customers ask three sequential questions when replacing their personal devices

Purchase	Use	RECYCLE?

1 — What do I do with my device?

- Recycle
- Secondary User
- Landfill
- Forget

2 — Why should I recycle?

- Environmental Impact
- Data Security
- Monetary Incentives

3 — How do I recycle?

- Convenience and Accessibility
- User Experience

RENAS

Consumers stockpile devices because they aren't aware of recycling as an option

*Increasing **awareness** of the existence and benefits of recycling programs will increase recycling rates.*

1 ----> **2** ----> **3**

What do I do with my device?

- Recycle
- Secondary User
- Landfill
- Forget

Why should I recycle?

- Environmental Impact
- Data Security
- Monetary Incentives

How do I recycle?

- Convenience and Accessibility
- User Experience

Source: Sustainability (academic journal)

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Individuals concerned with data security aren't motivated to recycle

*A recycling process that is both **secure** and **perceived as secure** is needed to motivate people concerned with data security to recycle personal electronics.*

1 ......→ **2** ......→ **3**

What do I do with my device?	**Why should I recycle?**	**How do I recycle?**

- Recycle
- Secondary User
- **Landfill**
- **Forget**

- Environmental Impact
- **Data Security**
- Monetary Incentives

- Convenience and Accessibility
- User Experience

Source: Bjørn Arild Thon (RENAS)

RENAS

If the personal costs of recycling are too high, consumers will not recycle

*A **convenient** and **simple** recycling process that respects the time of consumers is required to get consumers to act.*

(1)	**(2)**	**(3)**

What do I do with my device?	Why should I recycle?	How do I recycle?

What do I do with my device?
- Recycle
- Secondary User
- Landfill
- Forget

Why should I recycle?
- Environmental Impact
- Data Security
- Monetary Incentives

How do I recycle?
- Convenience and Accessibility
- User Experience

Source: Bjørn Arild Thon (RENAS)

⟳ RENAS

An effective plan for RedoIT will have three key components

1 Operations and logistics model must provide data security and convenience

RENAS

An effective plan for RedoIT will have three key components

1 Operations and logistics model must provide data security and convenience

2 Marketing initiatives must convey strength of data security practices and increase awareness of recycling programs

RENAS

An effective plan for RedoIT will have three key components

1 Operations and logistics model must provide data security and convenience

2 Marketing initiatives must convey strength of data security practices and increase awareness of recycling programs

3 Pilot of logistics and marketing models must be scalable

RENAS

An effective plan for RedoIT will have three key components

1 Operations and logistics model must provide data security and convenience

2 Our plans should incorporate people in adapted work programs like WorkIT in accordance with the mission of RedoIT

3 Pilot of logistics and marketing models must be scalable

RENAS

1

Recommendation 1

Logistics & Operations

Offer pre-paid shipping kits at Posten locations

Train data handlers to ISO standards

2

Recommendation 2

Marketing

Leverage partners

Advertise seasonally

Target key customers online

3

Recommendation 3

Pilot & Scale

Oslo pilot project

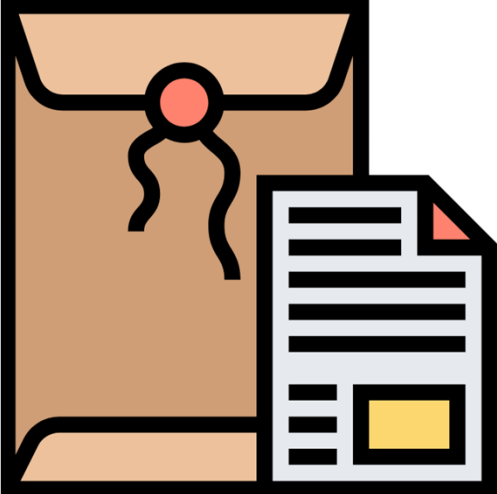Expand to high-volume cities first

Train local WorkIT equivalents

1

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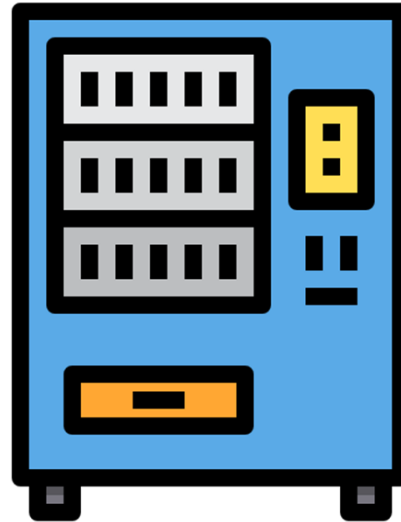
Norway currently recycles 97% of plastic bottles with the aid of TOMRA reverse vending machines and the Infinitum scheme.
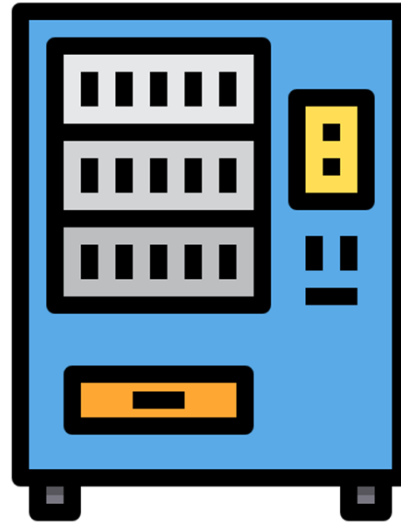
Why doesn't using a similar collection process work for a used personal electronic device?
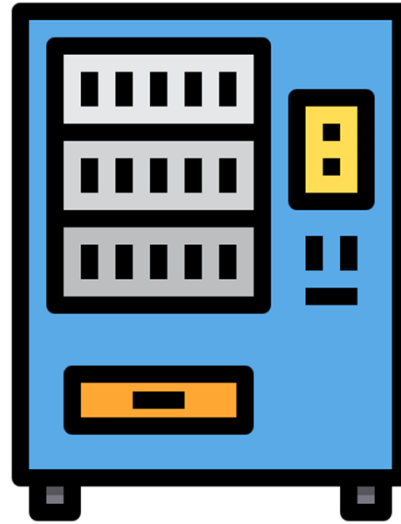
The key difference lies in the data.

Utilizing the Posten network to collect improves convenience and trust

Customer Experience

Brings used device to Posten office

Reads advertised instructions and explanation

Asks employee for free pre-paid recycling kit

Fills our form and packages device

Leaves device with Posten employee for shipment
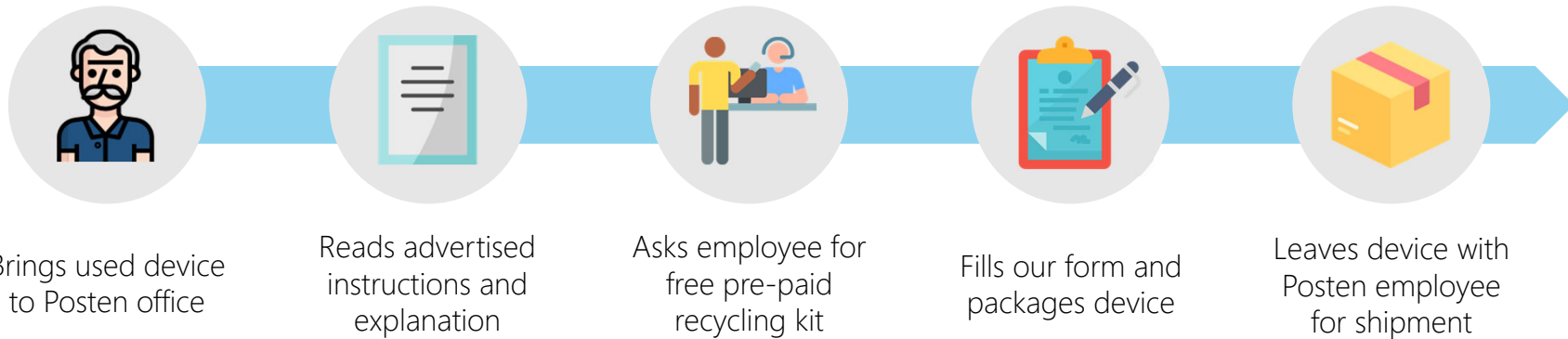
Backend Logistics

Option 1: Device Shipment

Ship devices **directly to WorkIT facility** using Posten services either individually or in bulk

Posten Norge

Option 2: Device Collection

Leverage **current box collection process** to pick up at PO boxes

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The Posten network is the most feasible and suitable collection system

posten

Adequate security measures in place

Extensive network throughout all of Norway

Locations optimized for accessibility

Case Studies

NESPRESSO®

FRETEX

Financial Feasibility

Expected Value vs Shipping Cost
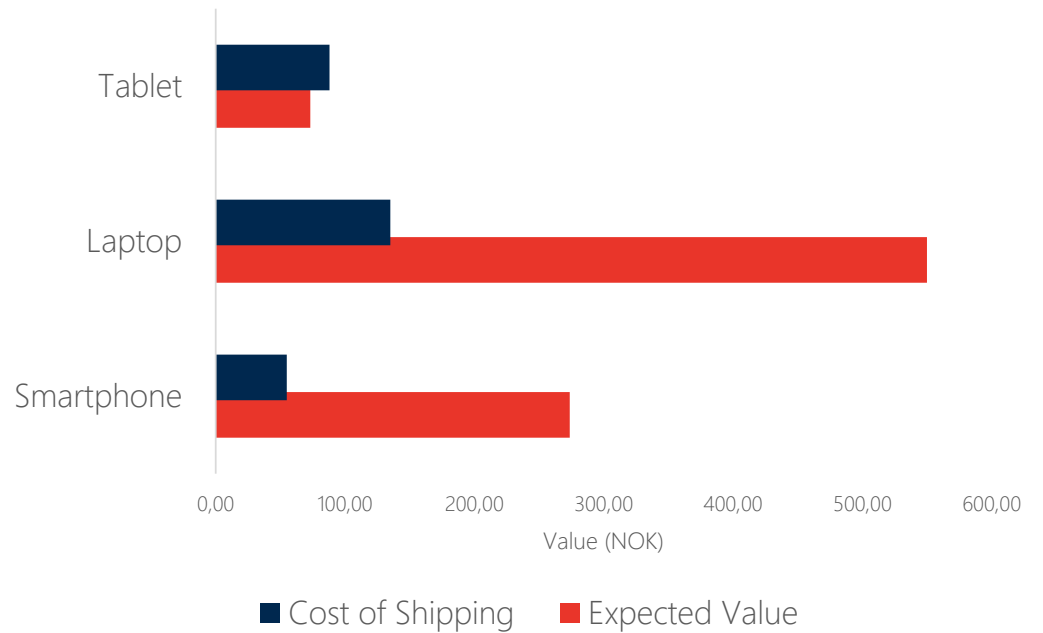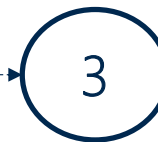
Tablet

Laptop

Smartphone

0,00   100,00   200,00   300,00   400,00   500,00   600,00

Value (NOK)

■ Cost of Shipping   ■ Expected Value

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Posten significantly improves the customer journey

Purchase → Use → Replace

1

What do I do with my device?

- Recycle
- Secondary User
- Landfill
- Forget

2

Why should I recycle?

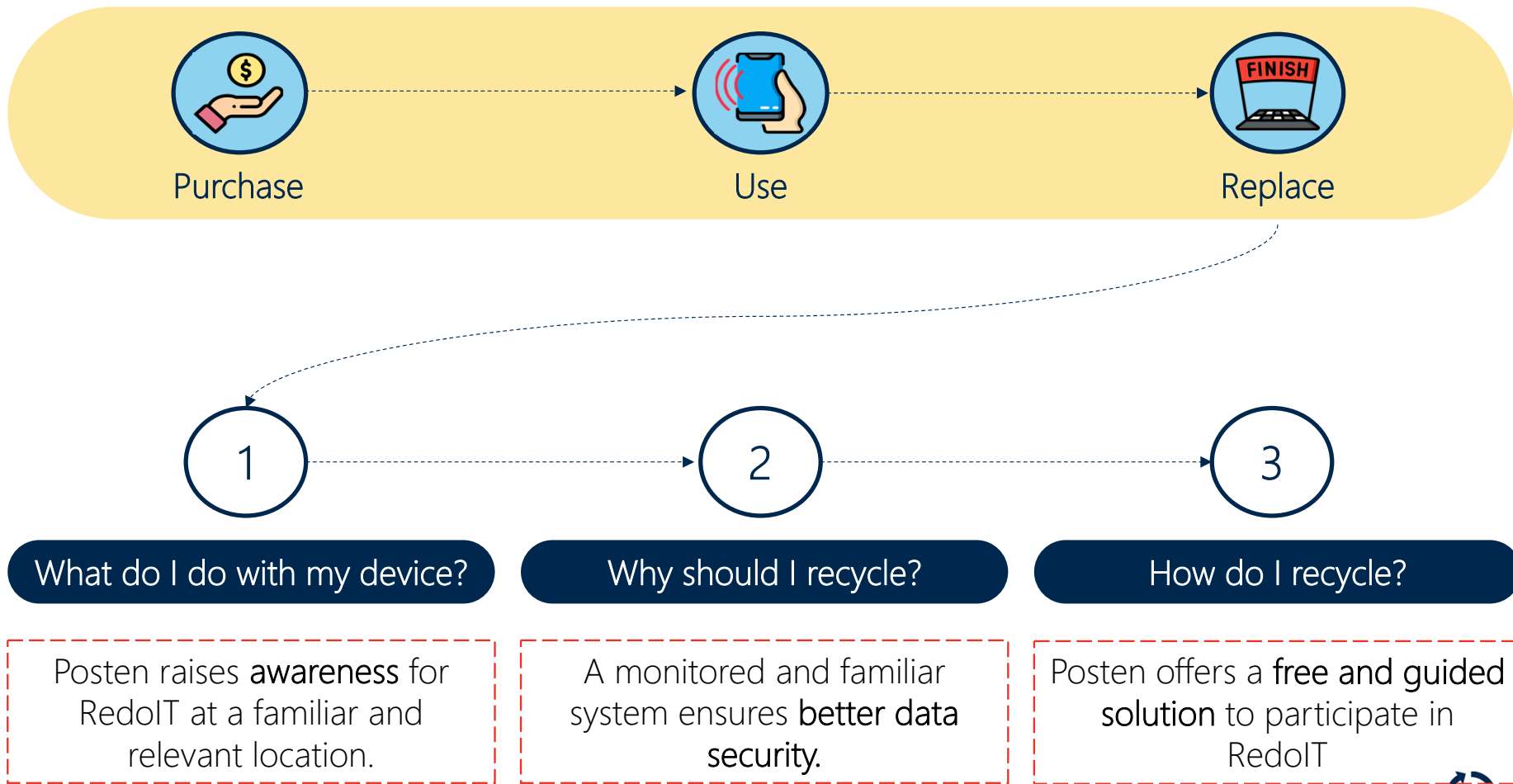- Environmental Impact
- Data Security
- Monetary Incentives

3

How do I recycle?

- Convenience and Accessibility
- User Experience

RENAS

Posten significantly improves the customer journey

Purchase	Use	Replace

1 — What do I do with my device?

2 — Why should I recycle?

3 — How do I recycle?

Posten raises **awareness** for RedoIT at a familiar and relevant location.

- Environmental Impact
- Data Security
- Monetary Incentives

- Convenience and Accessibility
- User Experience

RENAS

Posten significantly improves the customer journey

Purchase → Use → Replace
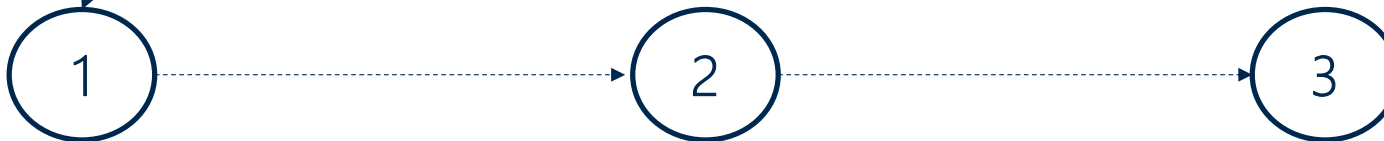
1 — What do I do with my device?

Posten raises **awareness** for RedoIT at a familiar and relevant location.

2 — Why should I recycle?

A monitored and familiar system ensures **better data security.**

3 — How do I recycle?

- Convenience and Accessibility
- User Experience

RENAS

Posten significantly improves the customer journey

Purchase → Use → Replace

1 → **2** → **3**

What do I do with my device?	Why should I recycle?	How do I recycle?
Posten raises **awareness** for RedoIT at a familiar and relevant location.	A monitored and familiar system ensures **better data security.**	Posten offers a **free and guided solution** to participate in RedoIT

RENAS
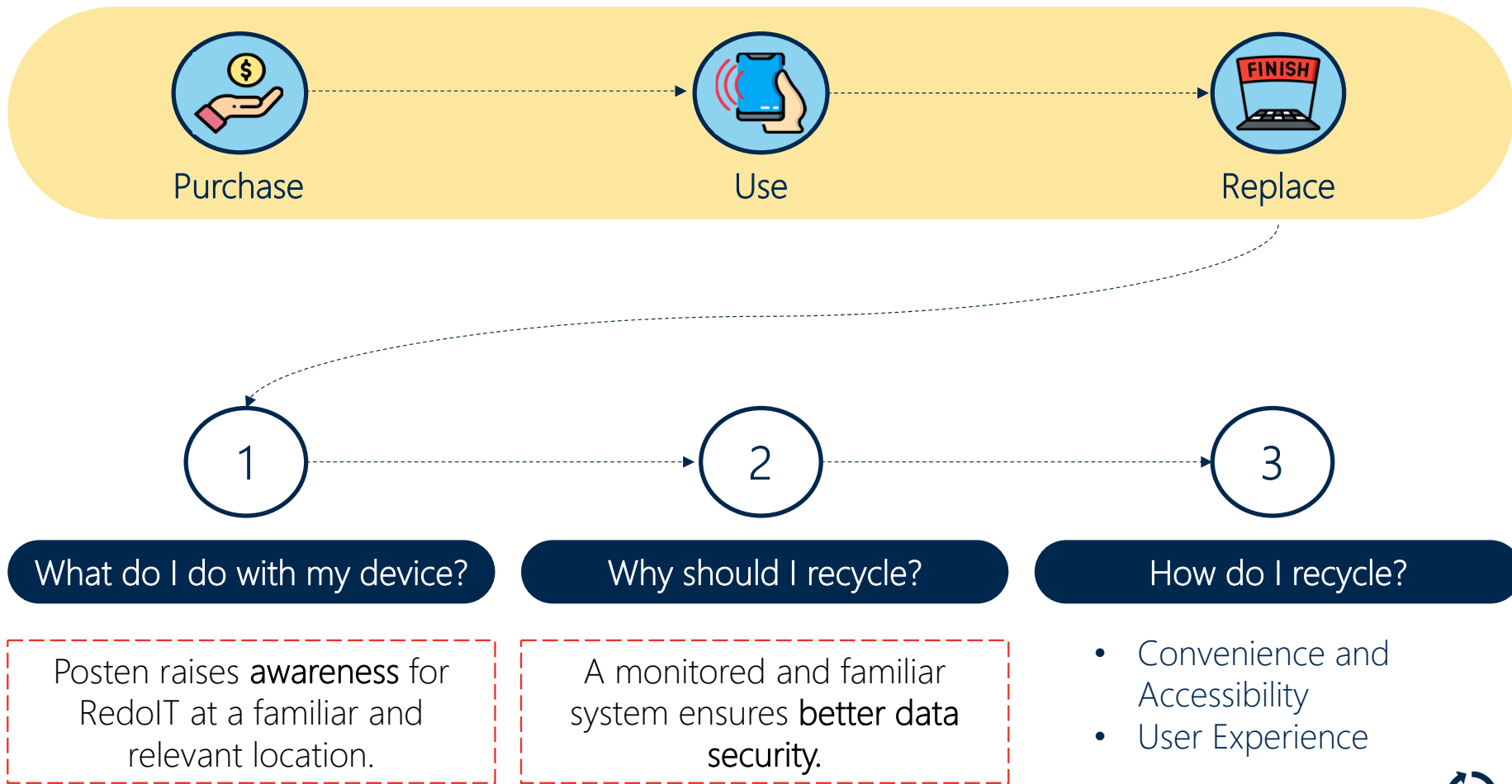
Safety of data practices can be ensured through 3rd party compliance

To signal data security and trustworthiness to privacy-conscious consumers, RedoIT will obtain internationally recognized, third party certifications for data erasure and environmental considerations

International and Norwegian Standards

| ISO 9001 Data Erasure | ISO 14001 Environmental Considerations | ISO 27001 Information System Security | Compliance with NSM |

1

Recommendation 1

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Recommendation 2

Marketing

Leverage partners

Advertise seasonally

Target key customers online

3

Recommendation 3

Pilot & Scale

Oslo pilot project

Expand to high-volume cities first

Train local WorkIT equivalents

RedoIT's marketing strategy is optimized by leveraging 3 key elements

Seasonality

Occasions related to used device recycling do not arise frequently – **key seasons** are crucial for raising awareness of RedoIT while it's **top of mind** of consumers

Partnerships

Capitalize on RENAS' existing relationships with 3000+ companies to **coordinate marketing efforts** with key consumer technology suppliers

Targeted Communications

Leverage social media marketing to target **specific consumer groups** and build **scalable** promotion strategy

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Partnerships with device sellers will allow RedoIT to capture the "Forgetful" market

Seasonality and Partnerships

Coordinate marketing efforts concentrated at **new device purchase points** to build on recycling momentum.

Recycling an Apple product is as easy as it is good for the planet.

You may be done with your device, but chances are it still has more to give. We'll help you recycle it for free. So we can save precious materials and take less from the planet.

Drop off at Apple store › | Drop off at Posten office ›

RENAS

Partnerships with device sellers will allow RedoIT to capture the "Forgetful" market

For the Data Worriers

Return your device to be recycled in just a few simple steps.

1 Back up your device.

Don't lose your data. Back up your Apple device so your content and settings stay with you, even after you hand off your device.

How to back up your iOS device ›
How to back up your Mac ›

2 Erase the data from your device.

Before you turn in your device, remove your personal information. This data belongs to you and no one else.

How to delete your data on an iOS device ›
How to delete your data on a Mac ›

Learn about data recovery through RedoIT

3 Ship your device or drop it off.

Package your device and ship it with the label provided by our recycling partner. Or drop it off at the partner's location.[1]

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Partnerships with device sellers will Allow RedoIT to capture the "Forgetful" Market

For the Data Worriers

Seasonality factors increase the effectiveness of targeted Facebook advertisements

Seasonality and Targeted Communications

Advertise the RedoIT program during **Christmas** gift ordering and exchange period and benefit from high retail centre and post office visits

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Partnerships with online resale platforms will allow RedoIT to capture the "Unaware" Market

Partnership: Resale Market

An opportunity lies in the number of **unsold devices** on secondary buy and sell markets

Partnerships with online resale platforms will allow RedoIT to capture the "Unaware" Market

**Partnership:
Resale Market**

Users with products that have remained unsold for a long time can be targeted to consider RedoIT as an appealing option
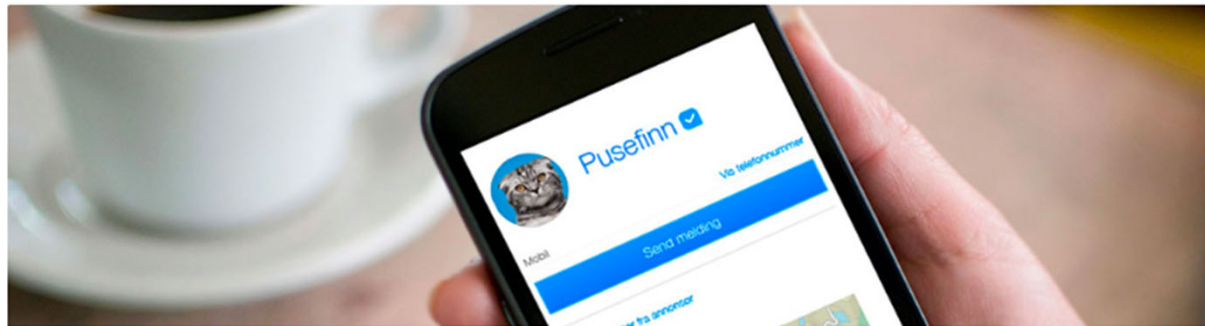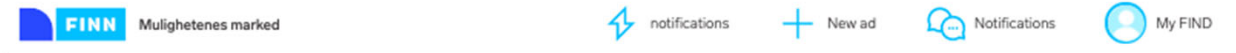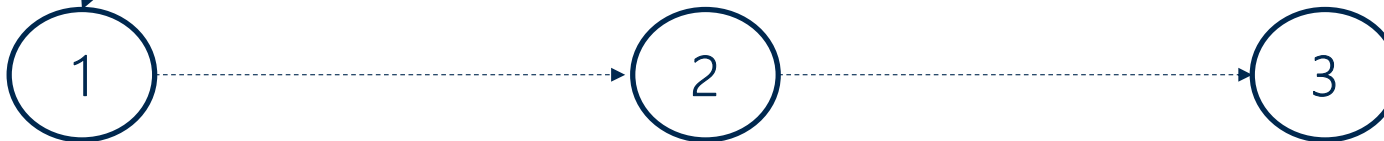
The 3 Key Pillars significantly improve the customer journey

Purchase → Use → Replace

1 **2** **3**

| What do I do with my device? | Why should I recycle? | How do I recycle? |

1
- Recycle
- Secondary User
- Landfill
- Forget

2
- Environmental Impact
- Data Security

3
- Convenience and Accessibility
- User Experience

RENAS

The 3 Key Pillars significantly improve the customer journey

Purchase → Use → Replace

1 → **2** → **3**

What do I do with my device?

Why should I recycle?

How do I recycle?

The 3 Key Pillars raise awareness for device recycling at the **most critical times.**

- Environmental Impact
- Data Security

- Convenience and Accessibility
- User Experience

RENAS
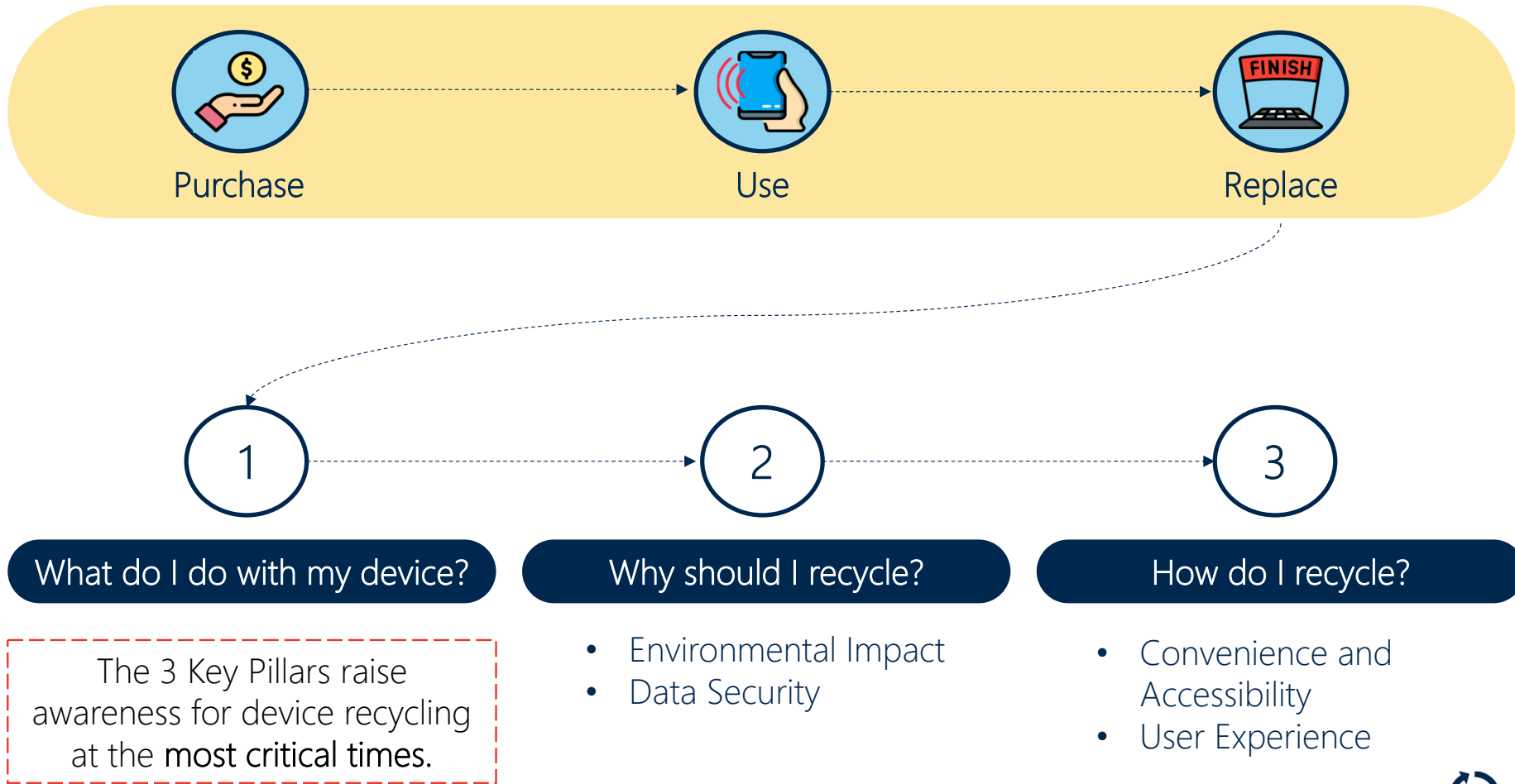
Expansion of business plan depends on key success metrics for pilot

Key Performance Indicators

Improved
consumer data

Growth in
recycling rates

New channel
profitability

Acquisition of
new unique
customers

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1

Recommendation 1

Logistics & Operations

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Recommendation 3

Pilot & Scale

Oslo pilot project

Expand to high-volume cities first

Train local WorkIT equivalents

Expansion within Norway will be made by targeting cities based on population
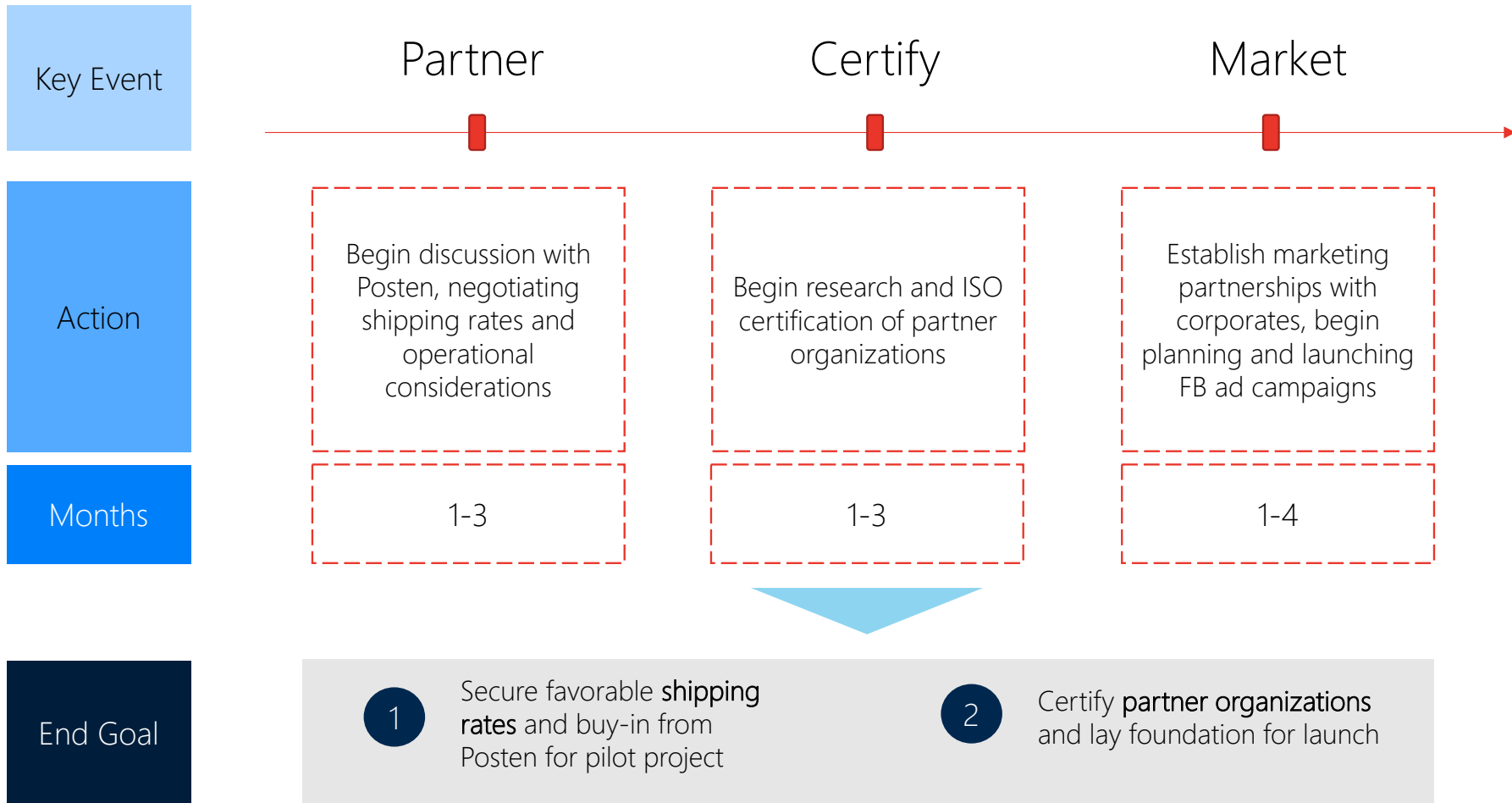
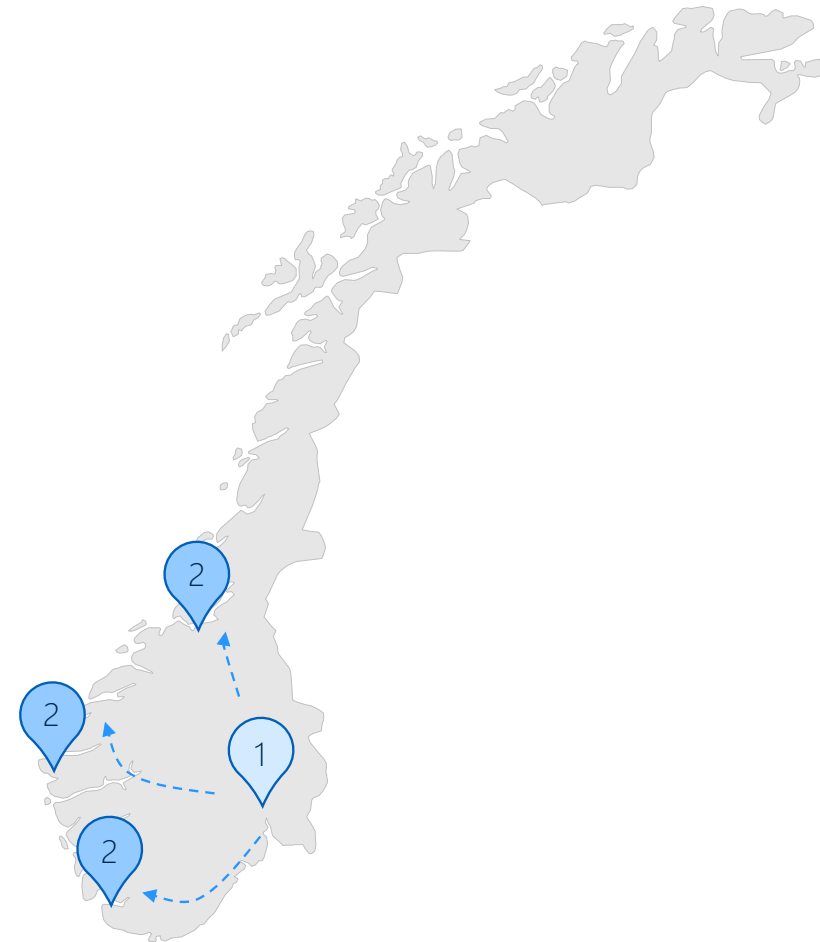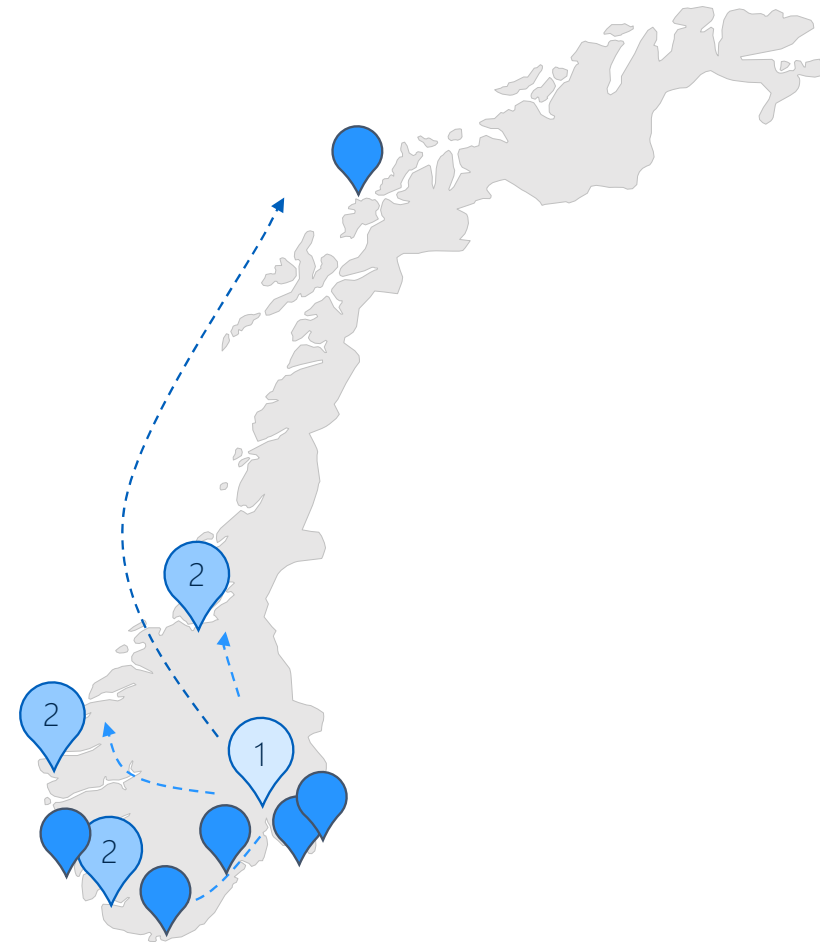| Norwegian Cities by Population Density |
| :---: |
| Oslo |

Timeline
Year 1: 1 City

RENAS

Expansion within Norway will be made by targeting cities based on population

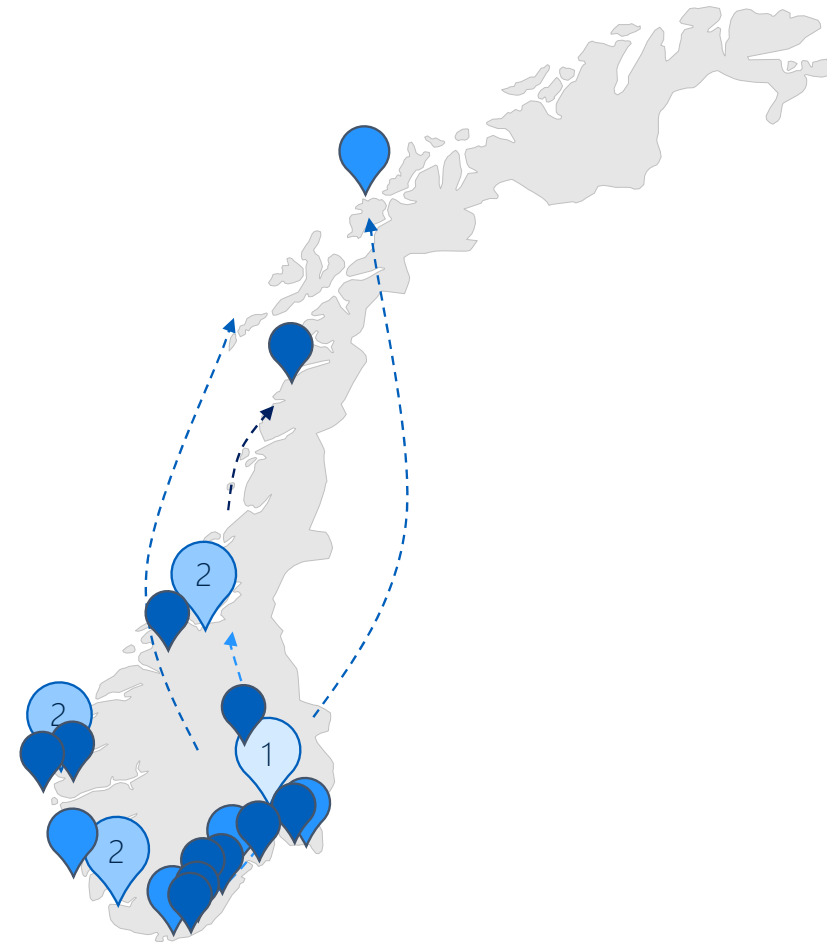| Norwegian Cities by Population Density |
| --- |
| Oslo |
| Bergen |
| Trondheim |
| Stavanger |

Timeline
Year 1: 1 City
Year 2: 3 Cities

RENAS

Expansion within Norway will be made by targeting cities based on population

Norwegian Cities by Population Density
Oslo
Bergen
Trondheim
Stavanger

Drammen	Sandnes
Fredrikstad	Tromsø
Kristiansand	Sarpsborg

Timeline
Year 1: 1 City
Year 2: 3 Cities
Year 3: 6 Cities

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Risks and mitigation for RedoIT business plan

Impact

Highest Impact

Lowest Impact

Marketing strategies fail to realize predicted increase in recycling

Device quality is too low to cover shipping costs

Target marketing partners are unwilling to co-market

Consumer frustration surrounding failed data recovery

Lowest Probability

Highest Probability

Probability
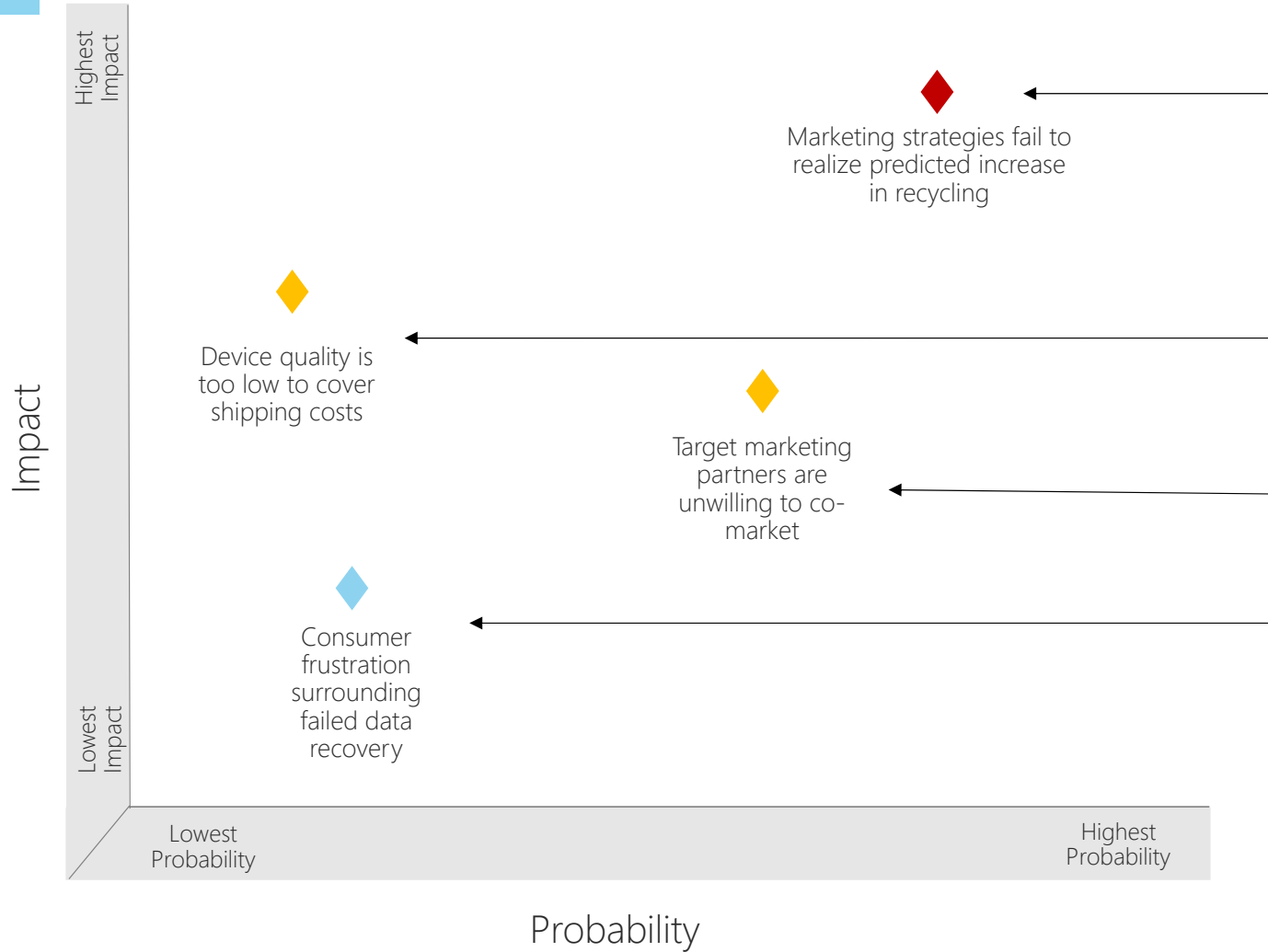
Use consumer data to better inform future spend and adapt marketing spend

Delay expansion until improved strategies can be identified and tested

Negotiate low shipping costs

Increase selectivity of device to optimize for most profitable types and models

Strategic targeting of sustainability oriented stakeholders in corporate ESG roles

Inform customers of the risk that not all data can be successfully recovered and returned

Refer customers that are particularly concerned for data return and recovery to an partner organization

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What is the environmental, social, and financial impact that we will have?

Cumulative Impact Year 3
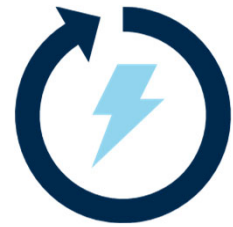
Devices Diverted from Landfill	Employment Created	Profit
95000	**20000+ hours**	**1,21 Million NOK**

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A scalable business model to recycle more personal electronics

1

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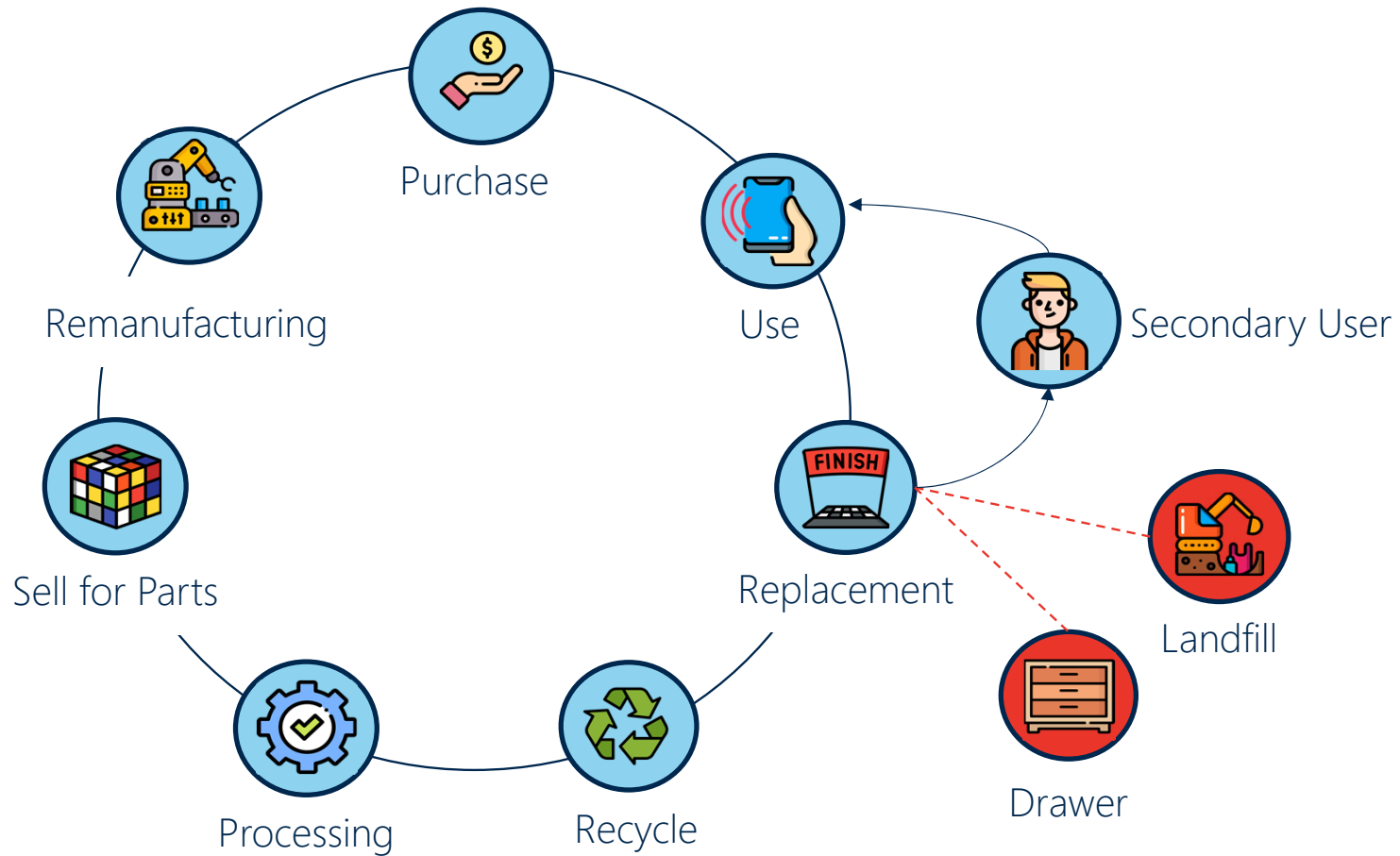
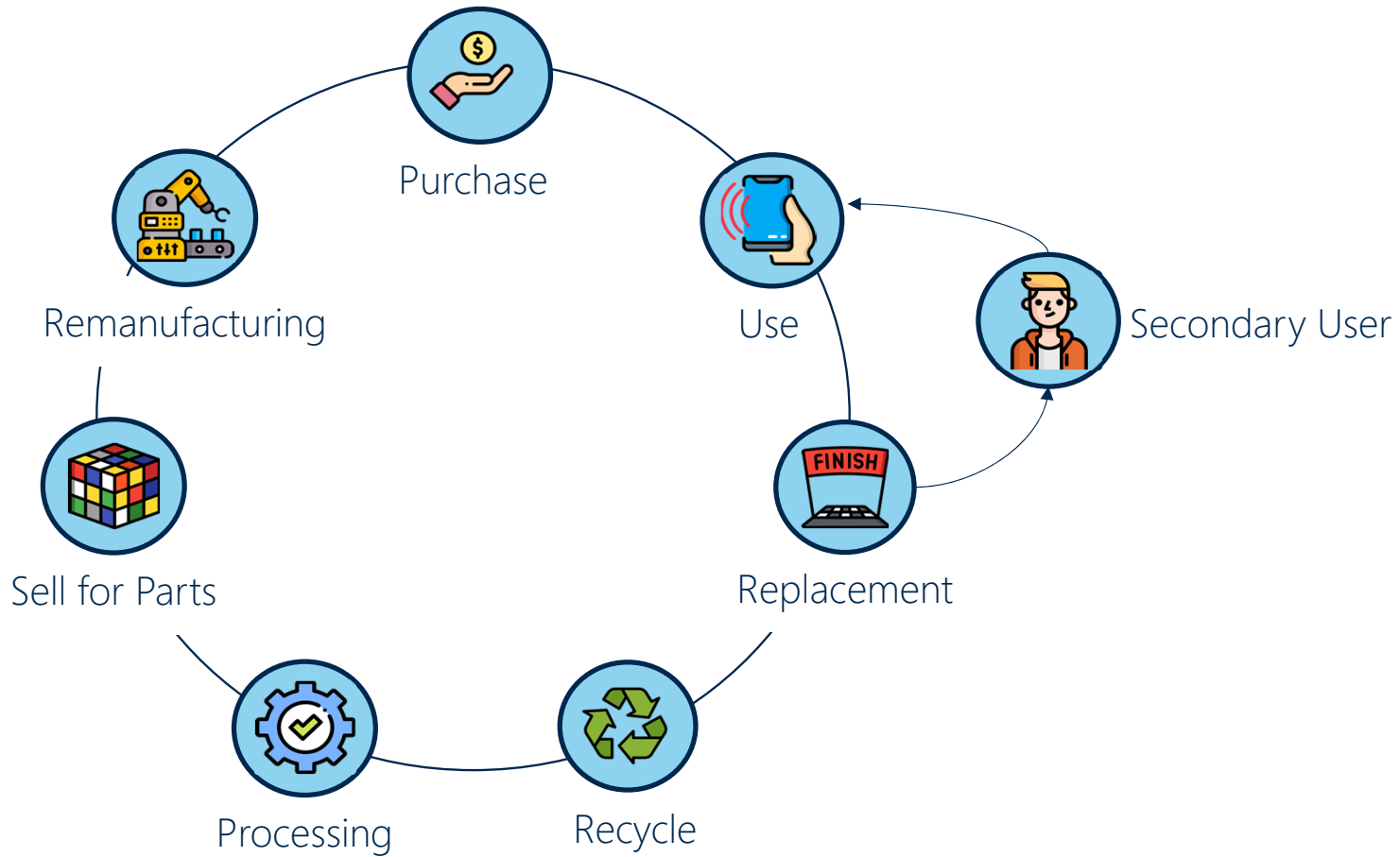Oslo pilot project
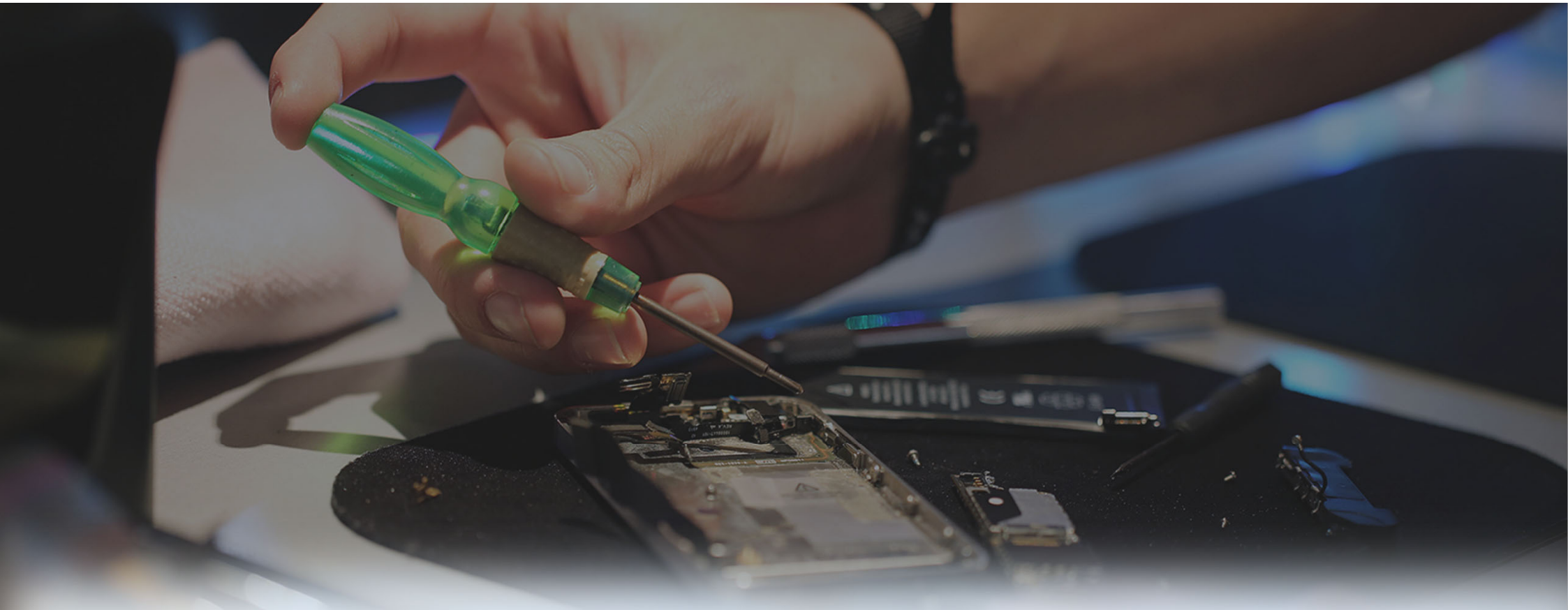
Expand to high-volume cities

Train WorkIT equivalents

RENAS has established the infrastructure needed to facilitate a circular economy

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Recycle

RENAS

RENAS

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Appendix

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Examining the Fretex and Nespresso partnerships in greater detail

	NESPRESSO®	**FRETEX**
Role of Posten	Customer handler accepts bags offered by Nespresso and ships to Oslo for recycling	Offers free bags and discounted shipment promotion
Benefit of Customer	Convenience in participating in meaningful aluminum recycling	Significantly discounted shipping rate and convenience of donation (NOK 50 for 8kg bag)

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Posten offices comfortably reach the majority of Norwegians
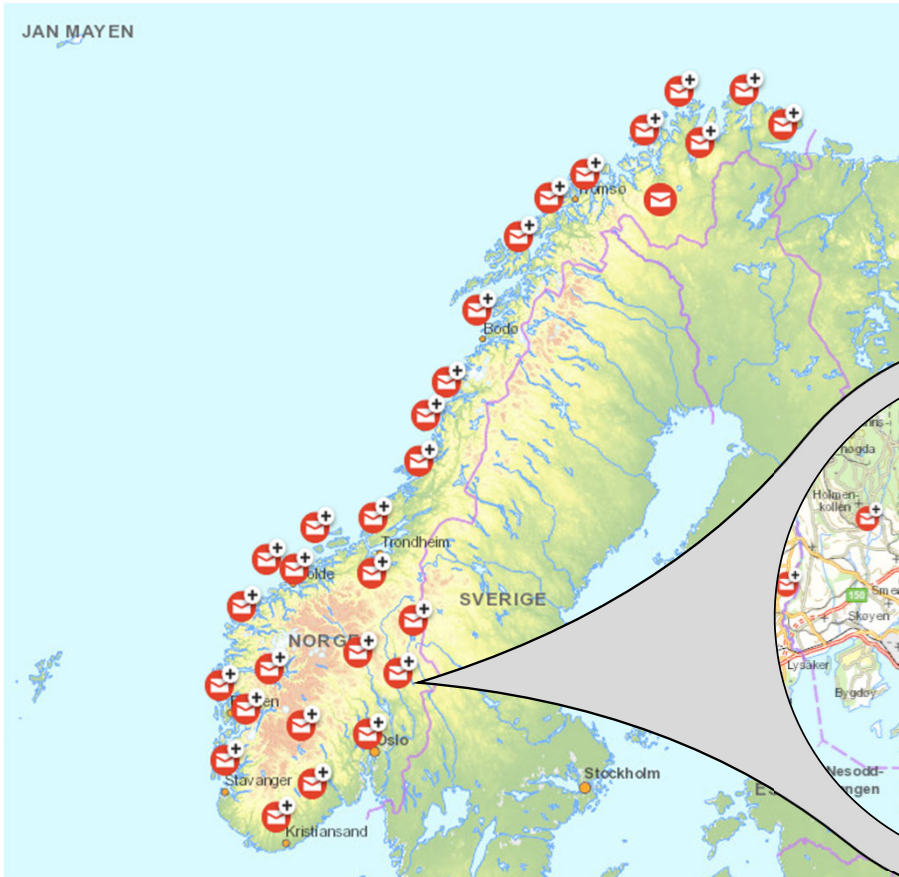
| Number of Posten Offices in Norway | 30 |
| Number of Retail Outlets in Norway | 1,400 |
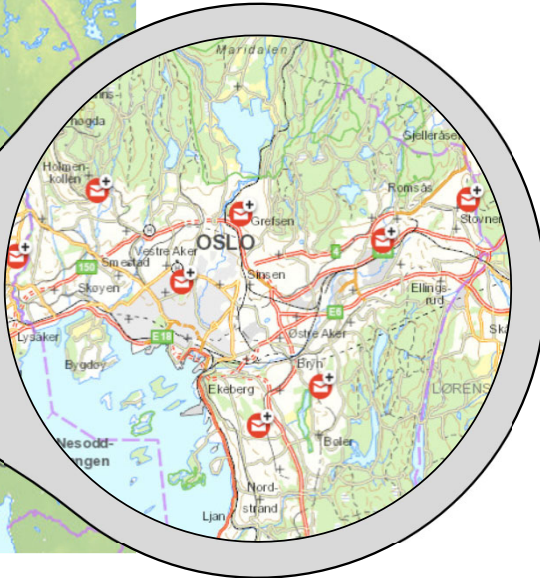
One third of Posten offices are in Oslo and offices in retail outlets are densely concentrated

Sources: https://snl.no/Posten_Norge_AS,, https://www.posten.no/en/map

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Why is Posten highly likely to support the proposed RedoIT partnership?

Increased Revenues

Pre-paid packages will serve as an **incremental revenue** source

Retail outlets containing Posten branches will experience **increased foot traffic**

Limited Operations Impact

Training of Posten staff isn't absolutely necessary

Packaging material needed for mailing goods is **already stocked** at post offices

Prior Causes Supported

Collection of clothes for **Fretex** and recyclable **Nespresso** pods have been performed by Posten for years

RedoIT is a **non-profit**

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Contents of Posten pre-paid shipping packages for personal electronics

Contents
Information card
Envelopes for smartphones, tablets and laptops, which may be placed in boxes for aggregating many devices
Protective bubble wrap

Information to Collect:
Required information if requesting data deletion and/or retrieval: • Name • Email Address • Data Preservation Needs

Voluntary Survey:
Optional point of feedback collection: • Have you used RedoIT before? • Have you recycled electronics before? • How was your experience recycling through Posten? • How did you hear about RedoIT?

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Alternative Considered: Increasing Security of Existing Drop-off Boxes

1

2

3

Additional Costs

Need for meaningful alternative channel to resolve usage gap

Lower Scalability

Adding security features to drop-off boxes would result in higher cost increases than leveraging Norge Posten's existing logistics and safe storage system

Drop-off system is effective at capturing the existing 50% of the market – new solution must address important loopholes

The nature of Norge Posten's unique business model significantly reduces the difficulty associated with expanding to other parts of the country, making operations and learnings much more scalable

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When do trucks become unviable for low value waste products?

When should you use a truck to collect lower value electronics at posten?

Truck Annual Operation and Leasing Cost	943000
Device Expected Revenue	73
Devices Collected	12896

- Must expect to collect 12896 low value devices for pickup trucks to be viable after factoring wages and leasing costs.

- When scaling out operations, smaller cities should not implement physical and instead focus on postal operations.

- Assigning one truck per city creates unprofitability in the model when attempting to scale to lower density cities in year 3.

Trucks in high-density areas allow us to profitably reclaim low value to size and value to weight ratio goods, but are not viable in lower volume areas

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Understanding the viability and scalability of the Posten model

Fundamental Formula

Cost of Shipping ❮ Expected Value of Shipped E-Waste
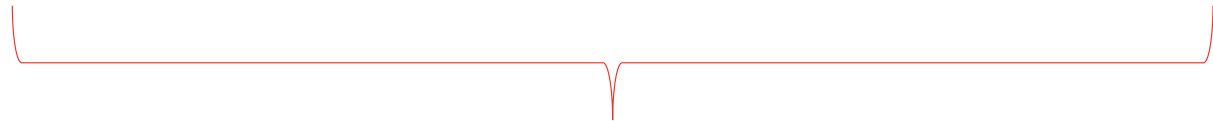
Device Type	Device Model	Device Age
Resale Value	Component Value	Material/Scrap Value

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Data deletion and return process fulfilled by WorkIT and equivalent organizations

1

Customer submits
electronics and
data form at Posten

2

Customer package
arrives at WorkIT

3

Package is opened
without damaging it
to enable reuse

4

Device assessment
and triage

9

Complete rest of
recycling process

8

Confirm
erasure of data

7

Receive confirmation
customer received data

6

Share data
with customer

5

Data recovery
(if demanded)

RENAS
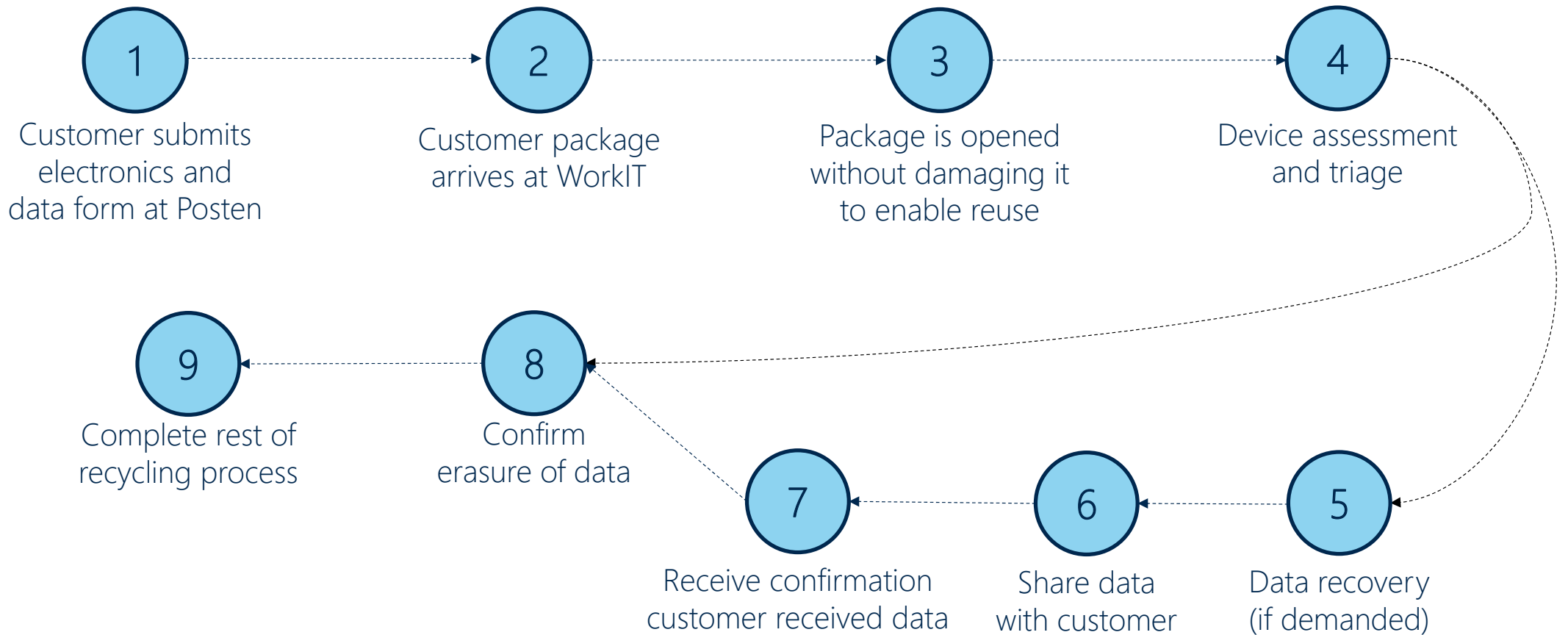
Secure Data Erasure Compliance and Trust Building

ISO 9001 provides requirements for an organization's Quality Management System (QMS)

Since a QMS constantly improves and monitors all areas of the business, benefits include better efficiency, less waste, increased productivity, and improved customer acquisition and retention.

ISO 9001 provides requirements for an organization's Environment Management System (EMS)

An EMS helps companies identify, manage, and improve their environmental impact through more efficient use of resources and reduction of waste.

ISO 27001 specifications are for an information security management system (ISMS). An ISMS is a framework of policies and procedures that includes all legal, physical and technical controls involved in an organisation's information risk management processes.

NSM is a cross-sectoral professional and supervisory authority within the protective security services that approves products and services as being suitable for use.

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Customer Profile for Facebook Advertisements

Create Audience   ×

Select the location, age, gender and interests of people you want to reach with your ad.

Name

[⚠]

Gender ⓘ

| All | Men | Women |

Age ⓘ

[18 ▾] - [65+ ▾]

Locations ⓘ

Canada

📍 **Canada**

Add locations

Detailed Targeting ⓘ

Include people who match ⓘ

Add demographics, interests or behaviors | Suggestions | **Browse**

Gender, Age and Location will be set to the ideal portion of the population in Oslo

RENAS

Customer Profile for Facebook Advertisements

Detailed Targeting ⓘ

Include people who match ⓘ

| Add demographics, interests or behaviors | Suggestions \| **Browse** |

▼ | **Demographics**   ⓘ

   ▶ | Education

   ▶ | Financial

   ▶ | Life Events

   ▶ | Parents

   ▶ | Relationship

   ▶ | Work

▶ | Interests   ⓘ

▶ | Behaviors   ⓘ

Exclude People

Specific Demographic, Behaviour and Interest settings can be toggled to target specific audience groups

RENAS

Customer Profile for Facebook Advertisements

Include people who match ⓘ

Add demographics, interests or behaviors	Suggestions	**Browse**

Uses a mobile device (1-3 months)	☐
Uses a mobile device (10-12 months)	☐
Uses a mobile device (13-18 months)	☐
Uses a mobile device (19-24 months)	☐
Uses a mobile device (25 months+)	☐
Uses a mobile device (4-6 months)	☐
Uses a mobile device (7-9 months)	☐
Uses a mobile device (less than 1 month)	☐

Exclude People

Include people who match ⓘ

Add demographics, interests or behaviors	Suggestions	**Browse**

▶	**Fashion accessories**	
▼	**Shopping**	
	Boutiques	☐
	Coupons	☐
	Discount stores	☐
	Luxury goods	☐
	Online shopping	☐
	Shopping malls	☐

Exclude People

People with low mobile device use time (less than 1 month to 6 months) and high use time (25 months +)

People "interested" in shopping have a high chance of coming in contact with recycling depots in stores and post office counters in retail locations
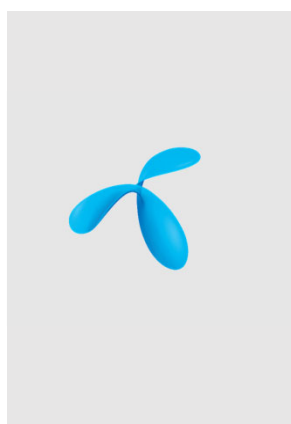
RENAS

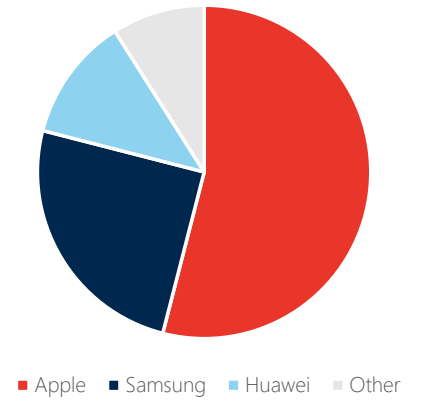# Potential Companies for Co-Marketing Partnership

Device Sellers
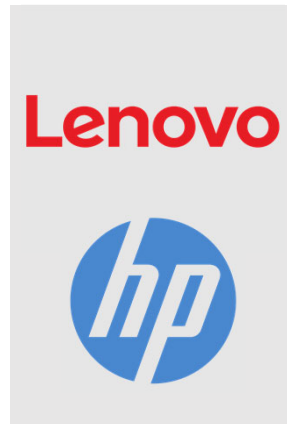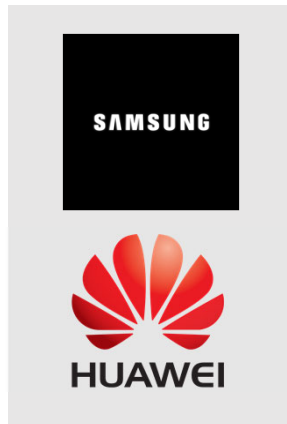
Telecom Companies

Norwegian Mobile Vendor Market Share (2020)

■ Apple ■ Samsung ■ Huawei ■ Other

RENAS

Implementation budget and assumptions for financials

Implementation Budget

Item	6 months	Year 1 (inclusive of 6 month period)	Year 2	Year 3	Year 4
WorkIT	201433	388500	403819	410545	423612
Cities	1	1	3	6	12
Number of Disassembly Workers	3	3	6	8	12
Training Hours	20	20	20	20	20
Hourly Wages	197	197	197	197	197
Monthly Wages	31520	31520	31520	31520	31520
Partnership Development	330000	660000	660000	1320000	1320000
Number of Additional Partnership Team Members	1	1	1	2	2
Annual Wages	660000	660000	660000	660000	660000
Facebook Ads	332762	412334	350192	260674	185876
Cost per thousand views	398	398	398	398	398
Reach	400000	600000	662000	437000	249000
Ad Agency Costs	173618	173618	86809	86809	86809
Pickup Trucks	943000	997000	2991000	2991000	2991000
Number of trucks	1	1	3	3	3
Monthly Leasing Costs	9000	9000	9000	9000	9000
Drivers	1	1	3	3	3
Annual Driver Salary	889000	889000	889000	889000	889000
Prepaid Postage	733920	1834800	3049438	3851245	5408990
Expected # of Devices	8000	20000	33240	41980	58960
Expected Cost of Shipping	92	92	92	92	92
Expected Revenue	1831270	4578174	7608926	9609588	13496458
Expected # of Devices	8000	20000	33240	41980	58960
Expected Revenue per Devi	229	229	229	229	229
Profit (NOK)	-709845	285540	154476	776124	3166980

Assumptions

Even split between smartphones, tablets, laptops

Pilot goes well, scale to two cities in year 1

Facebook ads will show on average one ad to each member of the city

How many device will we pickup? Assume that of people seeing ads 2% will decide to take action

As you scale to cities with lower populations, it becomes unprofitable to run truck operations in those cities

Workers can disassemble 4 devices an hour

RENAS

Cost and revenue drivers with underlying rationale

Cost Drivers

Facebook Marketing
(CPM * Desired Reach)

WorkIT Labour
(Training Hours * Wages + Salary)

Prepaid Packaging Expenses
(Cost per Package * Devices Shipped)

Trucking Labour and Operations
(Lease + Driver Wages)

Revenue Drivers

Resale Value of Devices
(Price * Depreciation Rate ^ years on market)

Value of Components
(Secondary Market Rates)

Value of Recovered Raw Materials
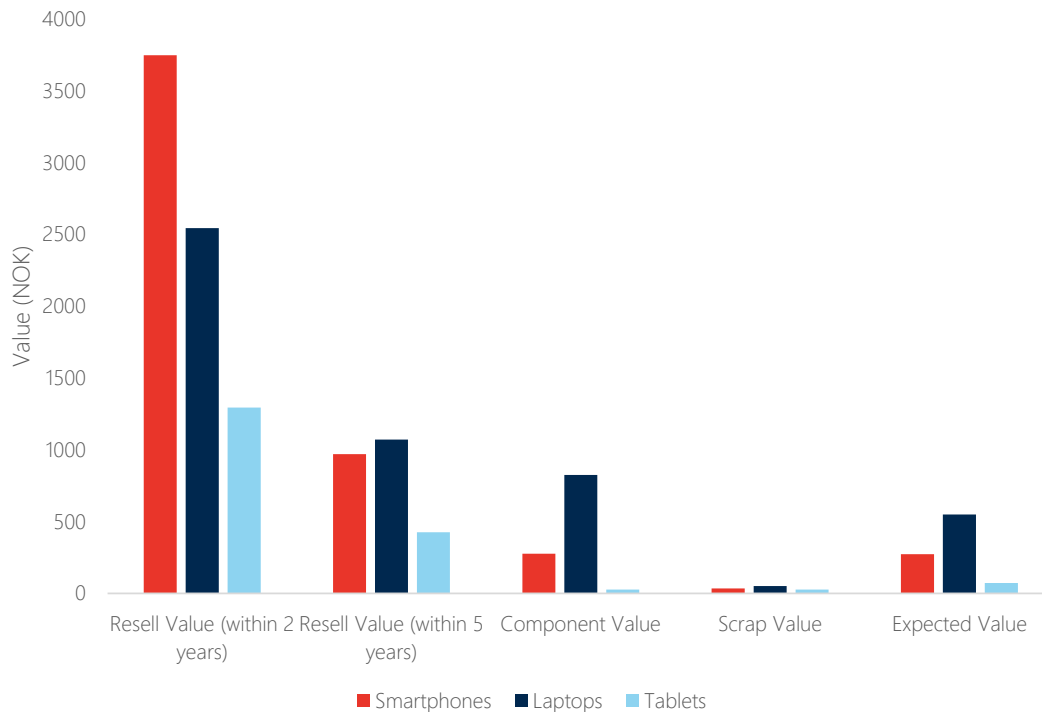(Recovered Material Weight * Market Value of Materials)

Mix of Recyled Waste (high / med /low)
Assume Even Distribution (in reality skewed to high)

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Expected value breakdown for used devices

Breakdown of Expected Revenue From Waste

Value (NOK) — categories: Resell Value (within 2 years), Resell Value (within 5 years), Component Value, Scrap Value, Expected Value

Legend: ■ Smartphones ■ Laptops ■ Tablets

Marketshare of Smartphone Brands and Their Value

	Market Share	Selling Price	Depreciation	Resale Value	Resale Value	Component Value
Apple	54.42%	1286	35%	543.335	149.213374	30
Samsung	25.28%	1000	40%	360	77.76	30
Samsung	12.06%	265	40%	95.4	20.6064	15
Other	8.24%	250	40%	90	19.44	15

Marketshare of Laptop Types and Their Value

	Market Share	Selling Price	Depreciation	Resale Value	Resale Value	Component Value
Windows	67%			210	52.5	87
Apple	27%			500	300	115

Market share of Tablet Types and Their Value

	Market Share	Selling Price	Depreciation	Resale Value	Resale Value	Component Value
Apple	85%	400		148	20.2612	3
Samsung	10%	261		96.57	13.220433	3
Others	5%	250		92.5	12.66325	2

Metric (USD unless stated)	Likelihood	Smartphone (averages)	Laptop	Tablet
Weight (g)		170	1400	680
Width (cm)		7	40	24
Length (cm)		15	27.94	16.9
Thickness (cm)		1	5	0.75
Resell value (recent models)	1%	405.61	275.30	140.08
Resell value (old models)	9%	104.95	115.94	46.14
Component Value	30%	30.00	89.25	2.95
Scrap Value	50%	3.76	5.63	2.95
Expected Value (NOK)		225.28	395.26	73.12

Sources: eBay, gsStatCounter, Research Gate

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Advantage of working with adaptive work programs

Uniquely Suited Skillsets

Social Impact

Employees with Aspergers are uniquely suited for detail-oriented and repetitive tasks such as disassembly and sorting.

Incorporating this talent into our plans allows us to create meaningful social impact, aligning ourselves with the Norwegian Ministry of Labour goals.

SPECIALISTERNE
Passion for details

unicus

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