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# Every.
# Thing.
# Connected.

## A study of the adoption of ‘Internet of Things’ among Danish companies

- A summary -

# Executive summary

### Danish adoption

Previous years have seen massive attention around the Internet of Things (IoT) but have brought little knowledge of its adoption among Danish companies. This report seeks to change that.

The report shows that the Danish companies surveyed have a much stronger faith in the potential of IoT than foreign counterparts but are less likely to have acted on the opportunity.

What causes this contradiction?

### 5 roadblocks

The analysis identifies five key roadblocks for IoT adoption:

- *A perceived high cost* of IoT that holds companies back.
- A challenge of *identifying the value capture* in a company-specific context - despite an almost unanimous belief in the potential of IoT.
- *A clash* between IoT and companies' traditional governance structures, as IoT still presents both uncertainties and a lack of historical precedence.
- *Paralyzation* that occurs when IoT requires a company to undergo change to a degree that it stifles action.
- *Knowledge gap* on IoT, especially among top management.

### Potential for improvement

At the same time, there is potential for improving structures that would be instrumental in overcoming the barriers. Only 39 percent of Danish respondents believe they have the organizational capabilities, and one of four believe they have the processes needed, to capture the IoT opportunity. At the same time, less than a third is increasing investments in IoT by more than ten per cent. As a result, there are more Danish respondents that do not feel better prepared than competitors to capture the value of IoT than do feel better prepared.

An IoT maturity continuum illustrates an opportunity to broaden the application of IoT.

### Recommended next steps

Finally, the report suggests four critical steps to take to get started with IoT:

1. Appoint dedicated leadership to drive IoT momentum
2. Evaluate value captures using both experiences from the four industries; utilities, healthcare, buildings and transport, and a maturity continuum
3. Create IoT adoption plan, categorizing projects into Simmer, Pilot, and Scale
4. Explore partnerships to fast track adoption

# A journey begun - but not with a head start

## A survey of Danish companies shows a strong belief in IoT but less action

The Danish respondents exhibit a comparatively strong belief in the 'Internet of Things' opportunity

**Global**

40%

Agree to
*"I expect the IoT to transform my business or offer significant new revenue or cost-savings opportunities within the next 3 years"*

**Denmark**

76%

There are more companies that do *not* feel better prepared than competitors to capture the value of IoT than *do* feel better prepared.

Companies indicated that 'lack of convincing business case' was the number one impediment to adoption of 'Internet of Things', which contrasts with the strong belief in its transformative power.

*"We are better prepared to capture the value of IoT than our competitors"*

46%
*Disagree*

29%
*Agree*

26%
*Do not know*

However, the Danish respondents are less likely to have started an IoT initiative.

**Global**

79%

Agree to
*"We currently have IoT initiatives ongoing"*

**Denmark**

60%

**Methodology**

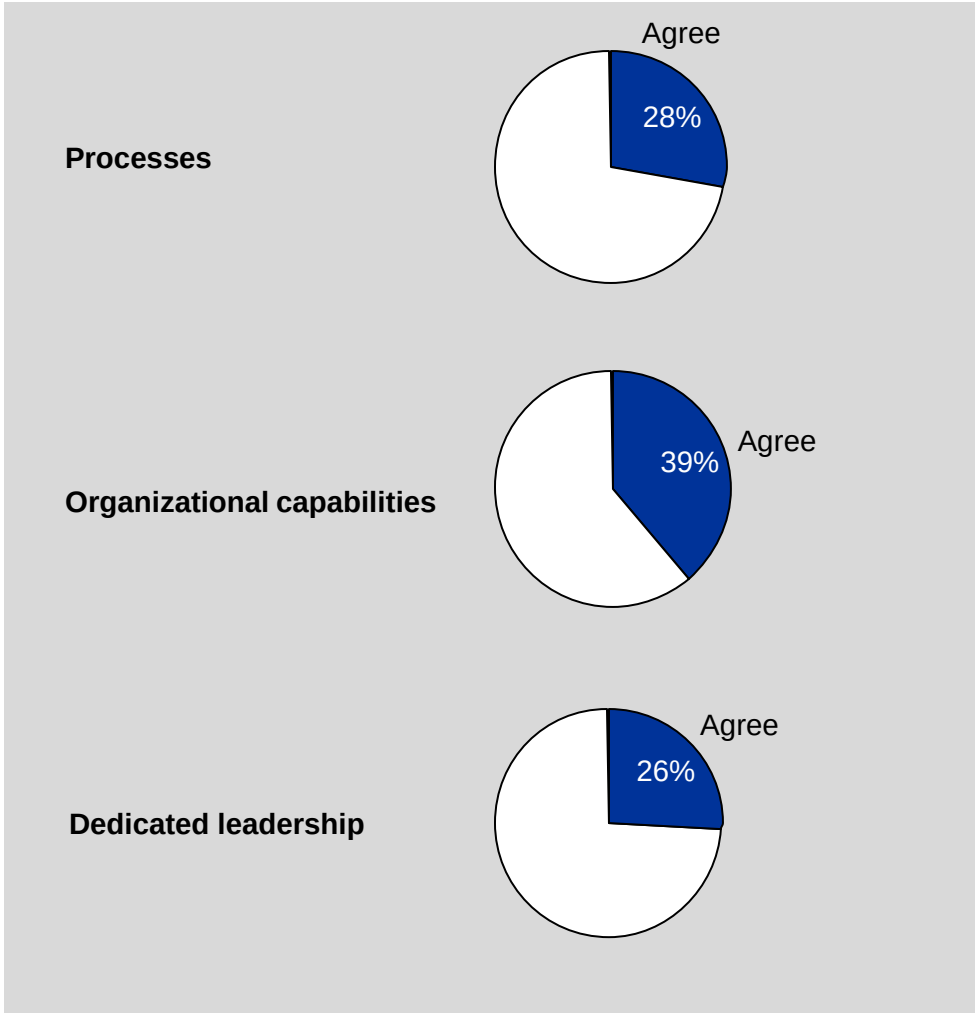
- Questionnaire survey among 35 IT and business leaders from leading Danish companies within Transport, Utilities, Healthcare, and Buildings (80%)
- Ten qualitative interviews with company leaders from companies with +5 billion MDKK annual revenue (80%), plus four expert interviews
- Benchmarked against global studies with 463 and 779 respondents, respectively

# Adoption of the ‘Internet of Things’ is held back

## Barriers created by a combination of process and organisational challenges

| | Theme | Quote |
|---|---|---|
| Handling new technologies | Action is paralyzed by IoT’s perceived threat to current business | *“A main impediment for IoT investment is its disruptive power to our industry and the insecurities that brings,”* one respondent |
| | IoT is not well understood by top management | *“Executives have a poor understanding of IoT… We talk about IoT in Computerworld instead of Børsen”* Martin Börjesson, CIO, DSB |
| Lack of convincing business case | Traditional governance structures rely on historical baselines | *“We have a zealous governance structure… that does not easily embrace an unconventional business case like IoT”* one respondent |
| | Perceived high cost of IoT holds companies back early experiments | *“Obviously, if you do not yet know how to create value from IoT, the cost easily becomes too high,”* Walter Hannemann, Head of Systems, Torm |
| | Companies do not know how to realize the value in their specific context | *“The challenge for IoT adoption is not technical but about finding the value - I do believe that IoT has potential,”* Lars Enevoldsen, Group Vice President, Grundfos |

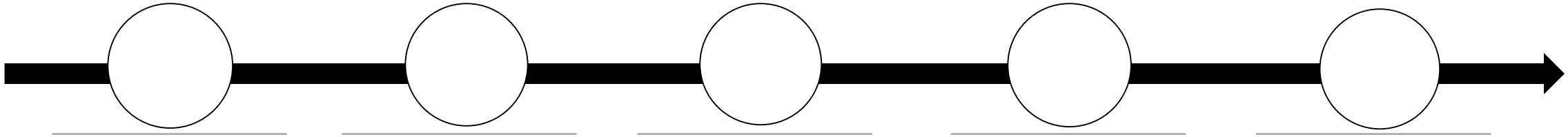
**% that have the structures needed to succeed with IoT**



# Internet of Things initiatives cover varying levels of sophistication

## A maturity continuum illustrates how value can be achieved and where there is potential for more

### The maturity continuum framework



**MONITORING**

IoT-enabled devices allow for substantial monitoring of product condition, the external environment, and product use. By enabling Big Data, this step alone presents not only a great opportunity but also a daunting task.

**CONTROL**

Instead of only providing data, 'Control' refers to the ability of products to respond to data (if X occurs, Y is performed), using algorithms and software.

**OPTIMIZATION**

In addition to previous steps, analytics enable continuous performance optimization. Preventive, as opposed to time-based, maintenance is enabled (as well as possibly remote repair).

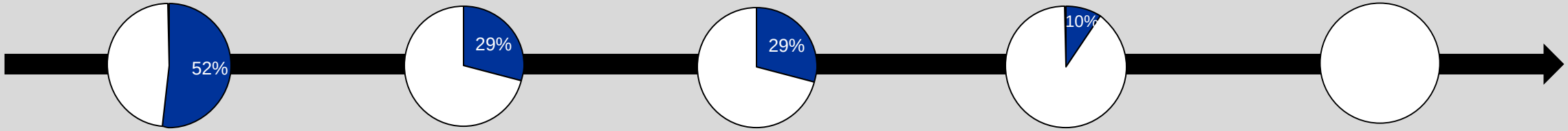
**AUTONOMY**

The product is able to work without human interference, continuously adjusting itself to data on the environment and user preferences.

**SYSTEM AUTONOMY**

Illustrates that the full potential of IoT lies in the ability to not only work autonomously but also in continuous dialogue with other connected things, impacting the function of both.

### Danish respondents' current utilisation of 'Internet of Things' capabilities (% that utilise each capability)

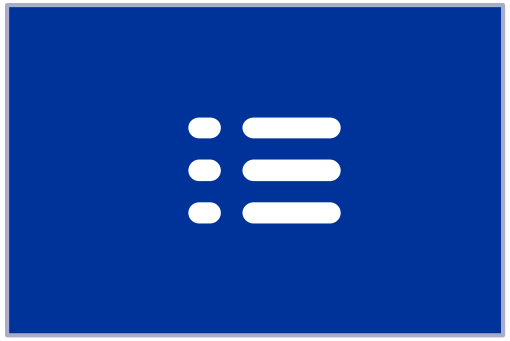


# Gain traction with the Internet of Things

## To get started with Internet of Things, a four step approach is recommended

- *Formalize the IoT visionary role, which is characteristic of companies that spearhead IoT*
- *The role will be to drive IoT strategy work, change management, and to bridge functional silos*

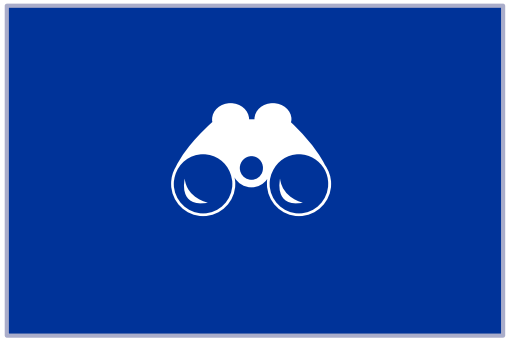
### 1 Appoint Dedicated Leadership



*Map IoT value captures/projects into:*

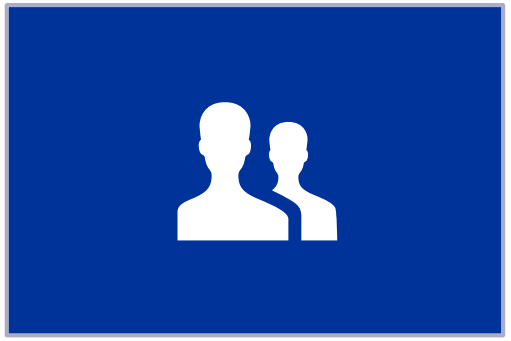
- *Simmer (not yet pursued - frequent business case re-evaluation)*
- *Pilot (technical and commercial purpose - measure impact)*
- *Scale (evaluate need to reengineer business processes)*

### 2 Create Adoption Plan



- *Using inspiration from the four industries, identify the company-specific value captures*
- *Based on the IoT maturity continuum, determine which IoT capabilities can maximise value capture*

### 3 Evaluate Value Capture



- *Fast track adoption of an area outside core capabilities*
- *Incorporate IoT efforts into the company's existing collaborative innovation set-up*

### 4 Explore Partnerships

# Inspiration on value capture from the Internet of Things

## Four industries where products on the global market are already generating value

### UTILITIES

#### Avoiding overload

- **ABB.** Smart grid tech that transmits data, alerting in case of overload
- **Curb**. Energy use sensors that enable partners to remotely control appliances
- **Elster.** Smart gas/water meters that enable communication with utility providers

#### Higher energy capture

- **GE-turbines.** Software and turbine sensors optimize angles to increase energy capture
- **Envision Energy**. Sensors on wind turbines spot maintenance issues and improve forecasting – but also enables real-time decisions to adjust blades

#### New service offering

- **Vestas**. Data from 27,000 windmills with each 1300 sensors are converted into an add-on service offering for customers

### HEALTHCARE

#### Higher quality of life

- **Medtronic**'s digital meter. Alerts before reaching a threshold blood-glucose level
- **Bee+** (Vigilant) insulin injection tracker. Transmits injection data to smartphone
- **Fitness bands** (Nike, Jawbone, Fitbit). Transmit data on activity, sleep, etc.

#### Lower costs

- **St. Jude Medical Accent Pacemaker**. Remotely monitors disease status.
- **CareTRx**. Tracks feedback from asthma medication, gives real time notifications
- **Proteus** ingestible sensor. Monitors and transmits data on medication taking

#### Better care

- **HealthID Band.** Transmits info on medical condition in case of emergency
- **Cortrium.** Automatically transmits vital sign measurements
- **Verasense orthosensor.** Delivers real time info about knee implant performance

### BUILDINGS

#### Efficiency improvement

- **Concrete Sensors**. Transmits data on temperature/humidity from inside concrete
- **Amazon Dash.** Button for any appliance that sense stock levels and reorders
- **Robin's.** When you enter a meeting room it is booked for you on the spot

#### Increase in safety and comfort

- **Dropcam Pro**. A networked camera that sends life feeds to the smartphone
- **Philips** Lighting hue lightbulbs. Blinks red if an intruder is detected
- **Nest Protect**. When sensing smoke, a camera activates for insurance purposes

#### Improved resource utilization

- **Daikin** Applied. Provides actionable data on e.g. heating to help failure prediction
- **Sensorist**. Sensors monitor e.g. air quality and sends data to smartphone
- **Danalock**. A lock that senses person and unlocks, hands free

### TRANSPORT

#### Improved utilization

- **Waze**. Pushes real time traffic/warnings info from and to connected mobile devices
- **Streetline**. Sensors under parking spaces communicate via mobile app, Parker
- **Tap & Park** app. Using sensors, it pilots drivers on the shortest route to free parking

#### Location transparency

- **Nigiloc**. Bicycles connected with Sigfox radios report GPS signals if the bicycle if stolen. The low cost ($2 / Sigfox radio) opens up doors for improvements in areas like logistics flow

#### Machine performance

- **Rolls Royce aircraft** sensors measure engine function to detect malfunctions
- **GE Aviation** evaluates expected vs. actual performance of hundreds of engine sensors
- **Taleris** aircraft sensors identify anomalies and determine replacement timing