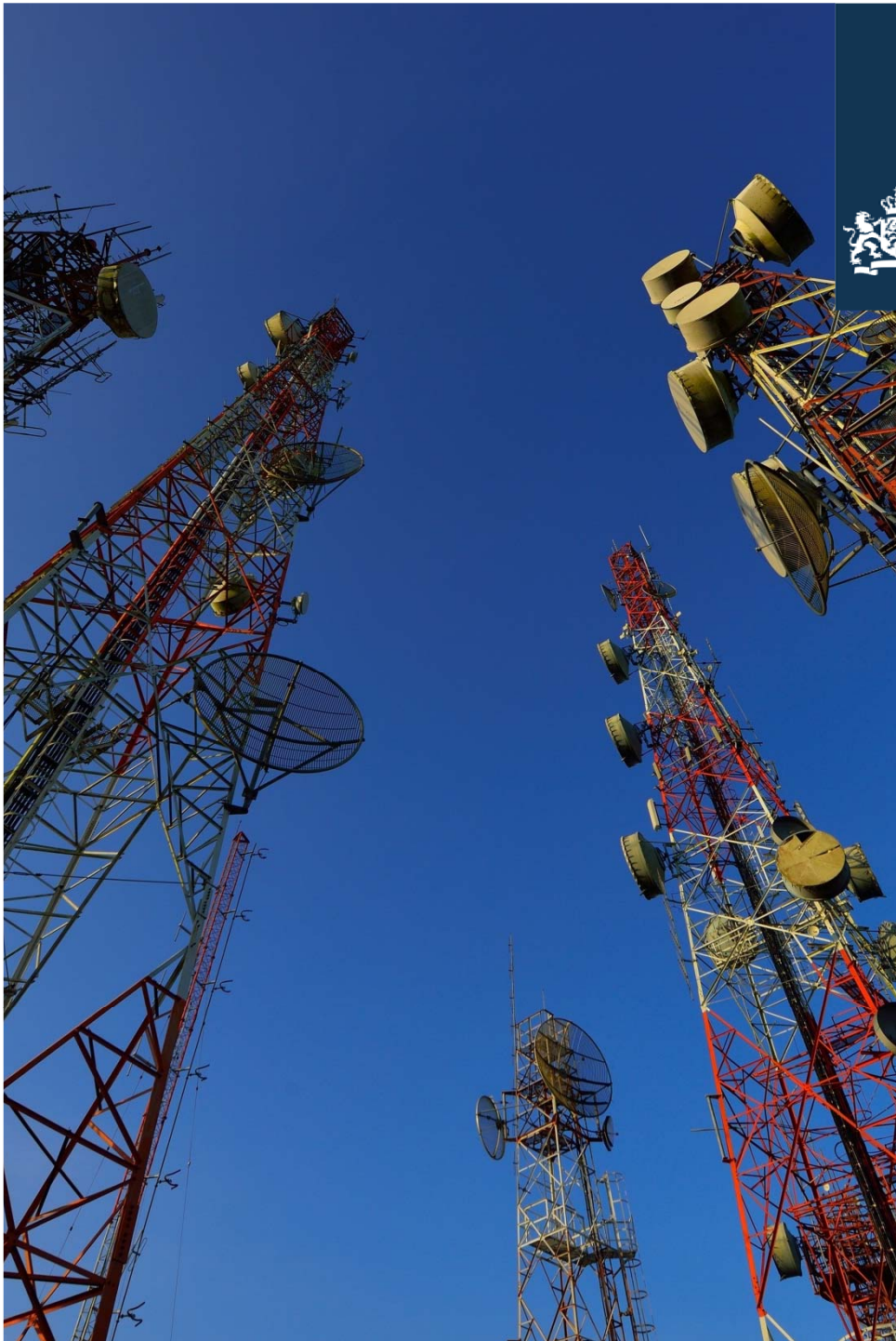


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**Contribution to the**

***Workshop Software  
and ICT Challenges in  
Legal Metrology***

***Berlin, june 2017***



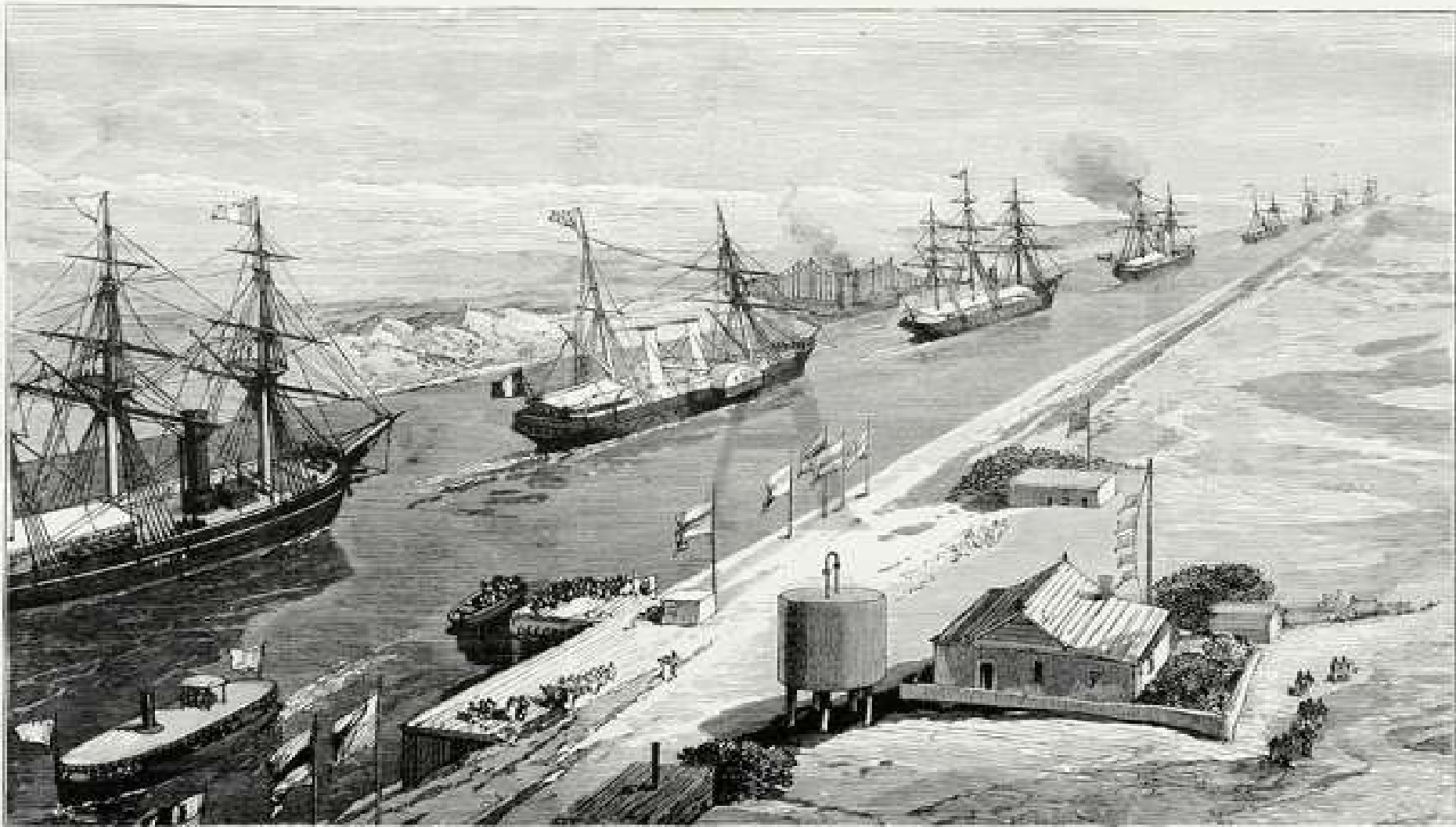
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# The Internet of Things

*Our next Black Swan?*

Robert Lambregts  
Jun 22th 2017







**Radiocommunications Agency**  
*Ministry of Economic Affairs*

## Robert Lambregts

- *Radiocommunications Agency of the Netherlands*
- Head of the '*Enforcement Policy & Sanctions department*'
- Graduated in Economics, and in Law
- But ... I am not a metrologist! ;-(



# ECD-radar 2015 - 2019

Trends in het elektronische communicatiedomein

Editie 6, 2015



Agentschap Telecom  
Ministerie van Economische Zaken

↑  
Toenemende relevantie

↓  
Toenemende relevantie



Evergreen 2019 2018 2017 2016 2016 2017 2018 2019 Evergreen

## Themalijnen

- Toenemend gebruik spectrum
- Gebruikersbehoefte aan data steeds meer mobiel
- Belang betrouwbaarheid en privacy neemt toe
- Nieuwe ICT-toepassingen in maatschappelijke sectoren
- Convergentie leidt tot steeds meer 'alles over alles'
- Meer belang milieu en duurzaamheid
- Behoeft andere rol overheid en internationalisering (toezicht, uitvoering en beleid)

Op de radar staan 23 trends die de komende jaren relevant zijn voor Agentschap Telecom:

1. cirkels = welke omgevingstrends worden signaleerd
2. relevantie = hoe groot is het belang voor AT
3. jaar = wanneer moet de organisatie voorbereid zijn op deze trend
4. kleur cirkels = themalijnen van gedclusterde trends

# ECD-radar 2015 - 2019

Trends in het elektronische communicatiedomein

Editie 6, 2015

## IoT:

- Explosive growth of sensornetworks, internetservices and M2M-communication
- New technological and economical possibilities
- Connected equipment(s)
- *Important enabler of new services* in sectors like health, energy, transport, industry and domotics
- Expected peak: 2018



8  
Internet  
of Things

18  
Telecom als  
levensbehoefte

7  
Innovatie  
spectrum-  
management

19  
Toename  
EMC  
problematiek

14  
Roep  
meerwaarde  
overheid

11  
Onbemande  
voertuigen

6  
Informatie-  
veiligheid

5  
ID-en  
Privacy-

...derende  
verdien-  
modellen



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## IoT characteristics

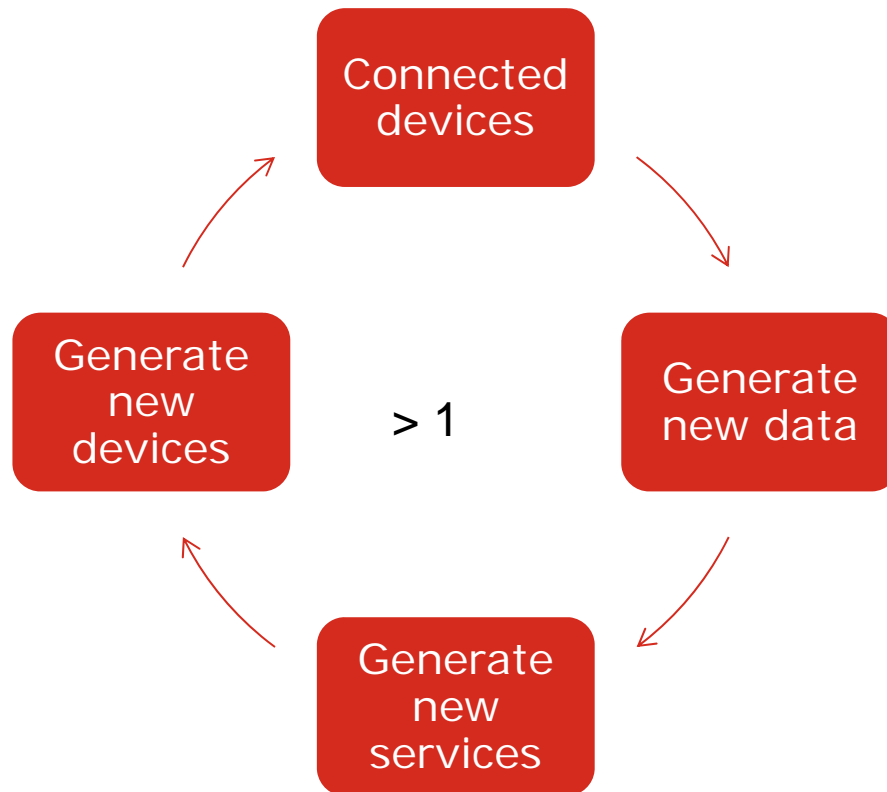
- Interconnected objects (like sensors)
- **A lot of them!**
- (estimated 50 billion in 2020 according to Cisco)
- This configuration enables added value to existing services and new opportunities



# 'Loop of Things'



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→ IoT: disruptive!

- 'Explosion' of new products & new services (global)
- Might be **gamechanger** in many fields, including metrology ;-)
- Frequency management considerations: interconnectivity is a *sine qua non*



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## Typical topics

- How can we facilitate innovation and transition?
- What new products/services?
- If connectivity is a *sine qua non*: new frequency bands needed?
- What about robustness, trust and datasecurity?



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To give the correct  
answers

...

You need to be able to  
look in the future

...

Which might be  
troublesome  
(for some of us) ;-)



(when) *experts speak*

1949 *Popular Mechanics*

*"Computers in the future  
may weigh no more  
than 1.5 tons"*



when experts speak

1977 Ken Olsen, Digital Equipment Corporation

*"There is no reason  
for any individual  
to have a computer  
in their home"*





when experts speak

1994 Bill Gates

*"I see little  
commercial potential  
for the Internet  
for at least 10 years"*



when experts speak

2005 Alan Sugar, Amstrad

*"Next Christmas  
the iPod  
will be dead,  
finished,  
gone, kaput"*



*Nassim Taleb, author of *The Black Swan**



My major hobby is teasing people who take themselves and the quality of their knowledge too seriously and those who don't have the guts to sometimes say: I don't know....

(Nassim Nicholas Taleb)



# Why can experts be so wrong? Why can't they see some changes?

Taleb suggest that there are *three* root causes:

## 1. **rare events:**

Rare events are events that are beyond the realm of normal expectations in history, science, finance and technology.

Taleb calls them '*Black Swans*'



## 2. non-computability

The non computability of the probability of the consequential rare events using scientific methods (owing to the very nature of small probabilities).

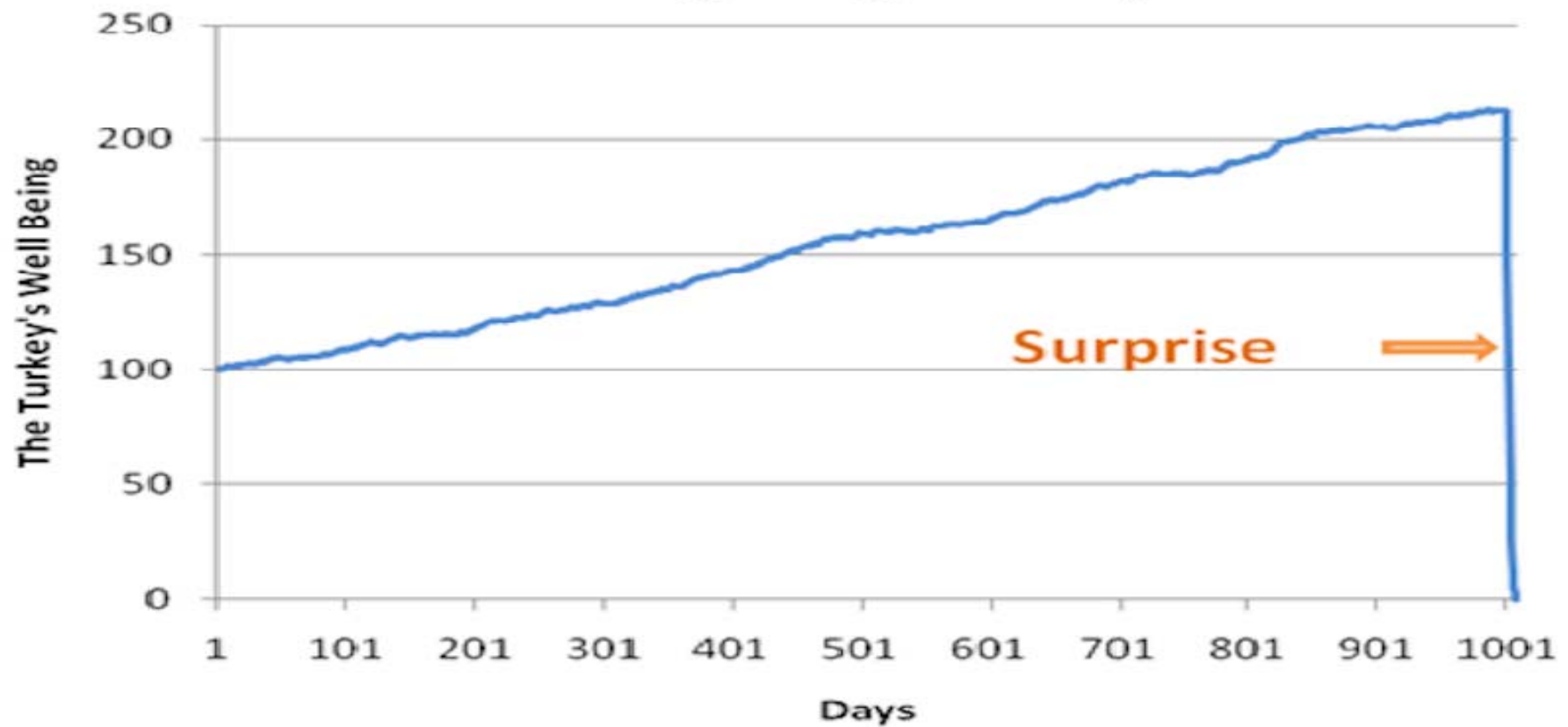
## 3. psychological bias

The psychological biases that make people individually and collectively blind to uncertainty and unaware of the massive role of the rare event in historical affairs.





## 1000 and 1 Days in the Life of a Thanksgiving Turkey





## For further reading

Nassim Taleb, *Black Swan. The Impact of the Highly Improbable*

Malcol Gladwell, *Outliers. The story of success*

Daniel Kahneman, *Thinking, Fast and Slow*



## IoT? These are my tips for you:

### DO

- Have the guts to say: 'I don't know'
- Recognize your and others biases
- Try to get the driving forces clear
- Explore logical options
- Be factual, critical and rational

### DON'T

- Trust 'experts' in the blind with new phenomena
- Just extrapolate recent data
- Have a 'spread sheet mentality'

**Remember the impact of the Suez Canal in the example!**





Best option imho: scenario-thinking

Scenarios present 'snapshots' of **possible futures**

They help you to **focus** thoughts, developing shared visions, and determining policy-choices

Scenarios do **not** predict 'the future', but make you aware of the **early indicators** of developments a can help you to decide in time what are your best options to act.





For further reading on the use of scenario's

<https://www.oecd.org/site/schoolingfortomorrowknowledgebase/futurethinking/scenarios/>

[http://forlearn.jrc.ec.europa.eu/guide/4\\_methodology/meth\\_scenario.htm](http://forlearn.jrc.ec.europa.eu/guide/4_methodology/meth_scenario.htm)

Kees van der Heijden, *Scenarios: The Art of Strategic Conversation*



## The Agency's and IoT

We consider:

- IoT might be a Black Swan
- IoT will impact our field of work  
(electronic communications and metrology)
  - We develop a set of IoT scenario's this summer, to find early indicators and strategic options
  - We intend to make them public via our website [www.agentschaptelecom.nl](http://www.agentschaptelecom.nl)

A photograph of several tall, red metal telecommunications towers with multiple yellow satellite dishes, viewed from a low angle against a clear blue sky.

Thanks  
for your  
attention!



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