

Digital Transformation and IIOT at Siemens

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**What we are sure
you already know**

**This is not
SIEMENS**



This is also not
SIEMENS



**And maybe
surprising**

This also not



**What you probably
also know**



**This is
SIEMENS**



**This is
SIEMENS**



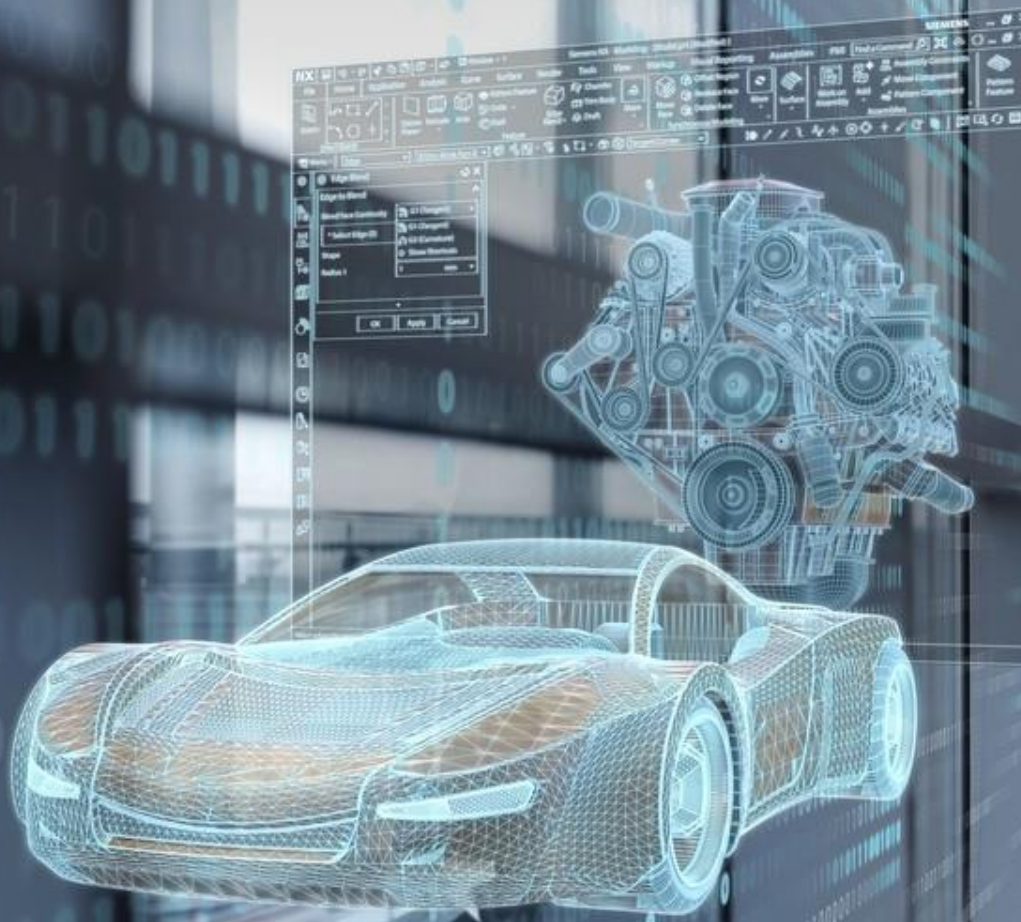
**This is
SIEMENS**



**This is
SIEMENS**



**This is
SIEMENS**



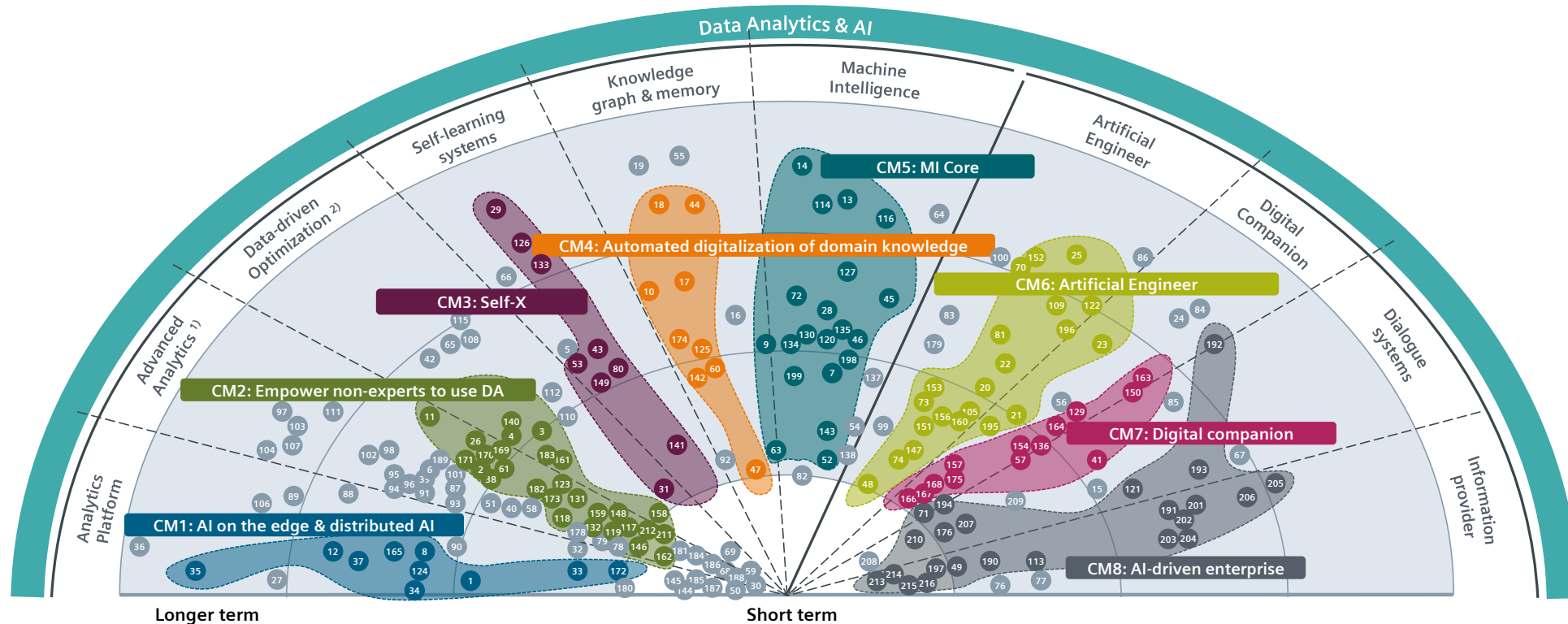
**This is
SIEMENS**

What you probably do not know

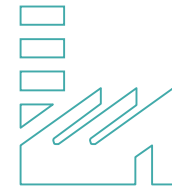
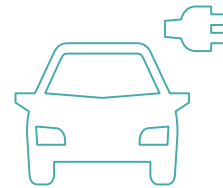
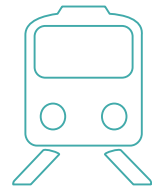
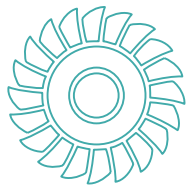
This is also SIEMENS

- **50+** Digi Labs and AI Centers around the globe (also in Munich)
- **500+** data scientists in Germany, **200+** in Munich
- **Thought leader** in Responsible AI (Charter of Trust, DIN Normungsroadmap KI)
- Filed **2,493** European patents in 2019 (more than any other company), **25%** in industry 4.0 and digitalization
- Corporate startup incubator Next47 with **20+** companies in the portfolio and **1bn €** to invest

Innovation happens in all core technology areas



We are IoT Digital Consulting



We are

21

offices

10

countries

+500

consultants

7,000

developers & engineers

And accompany our customers



From few central
power plants ...



... to 1000s of
renewable in-feed

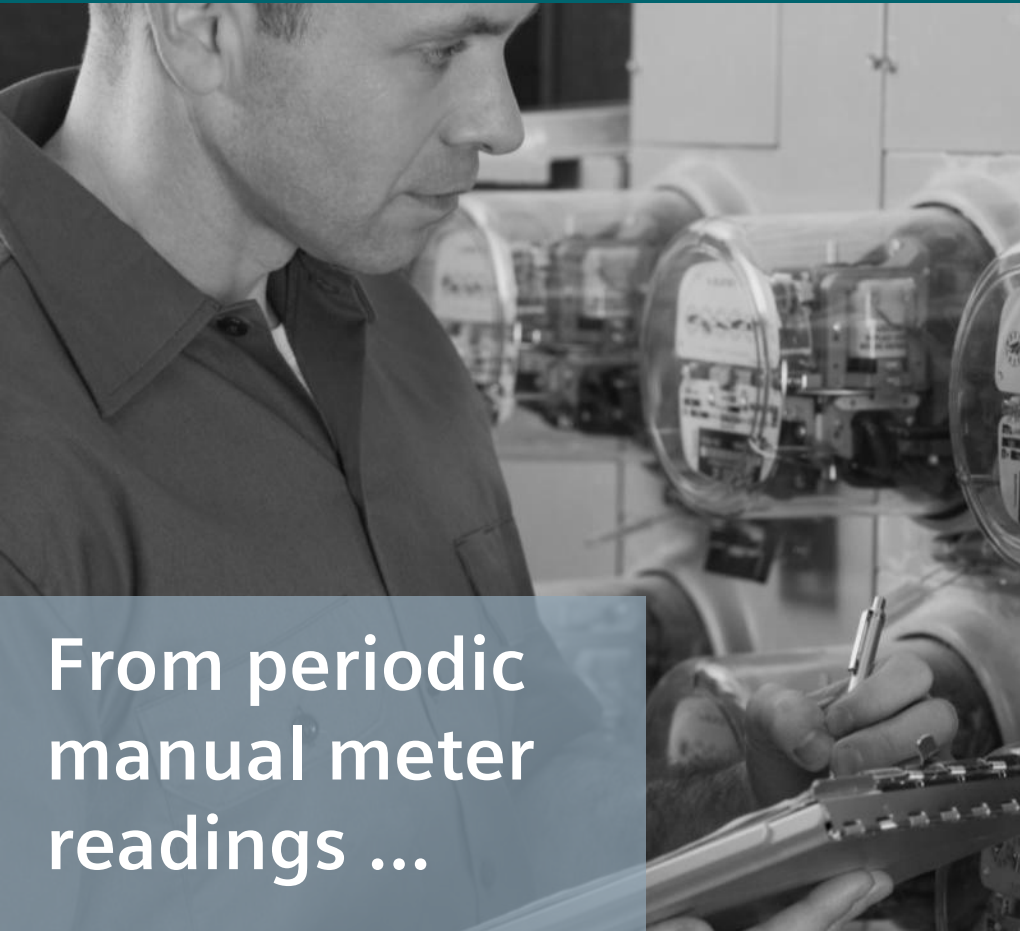
And accompany our customers

From manual
diagnostic-based
maintenance ...

... to data-driven
predictive maintenance



And accompany our customers



From periodic manual meter readings ...



... to real time online monitoring

Main question for today



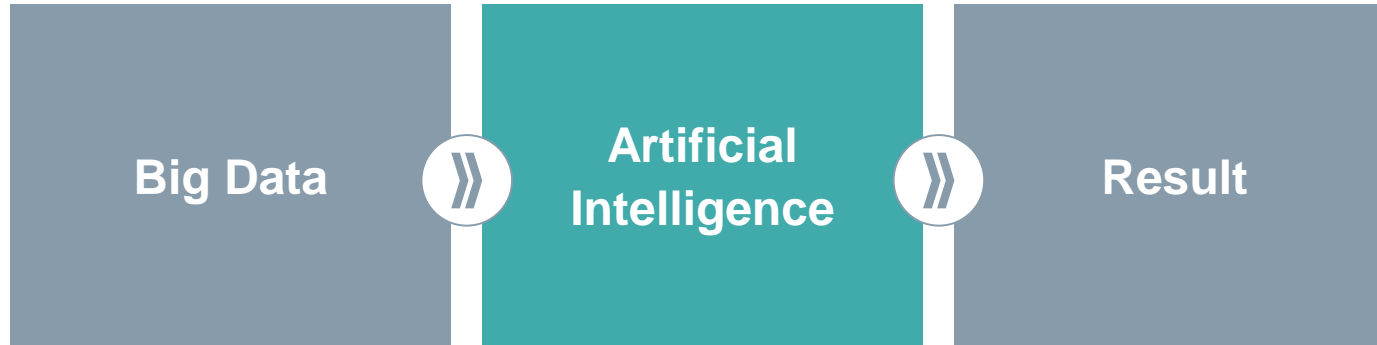
**What is it like to do data science
at Siemens IoT today?**



Big to smart data

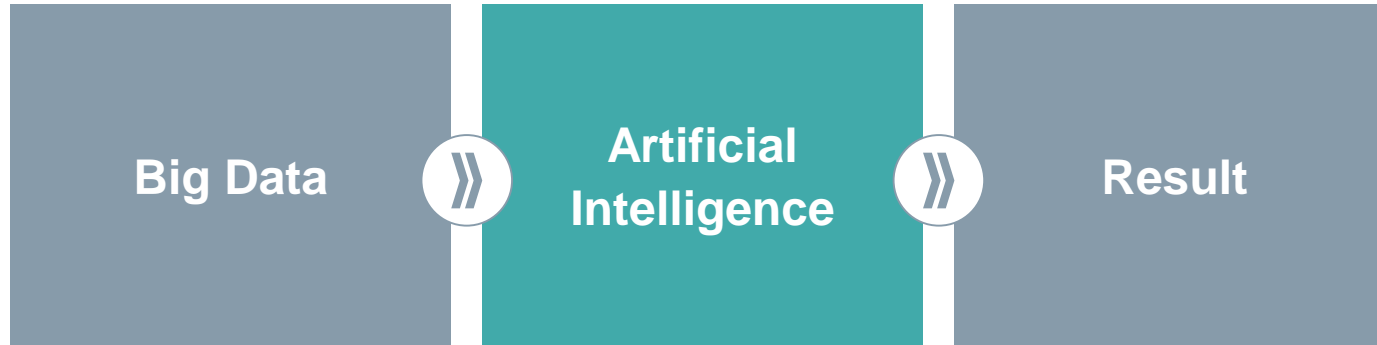
Big data vs. smart data

2000s



Big data vs. smart data

2000s



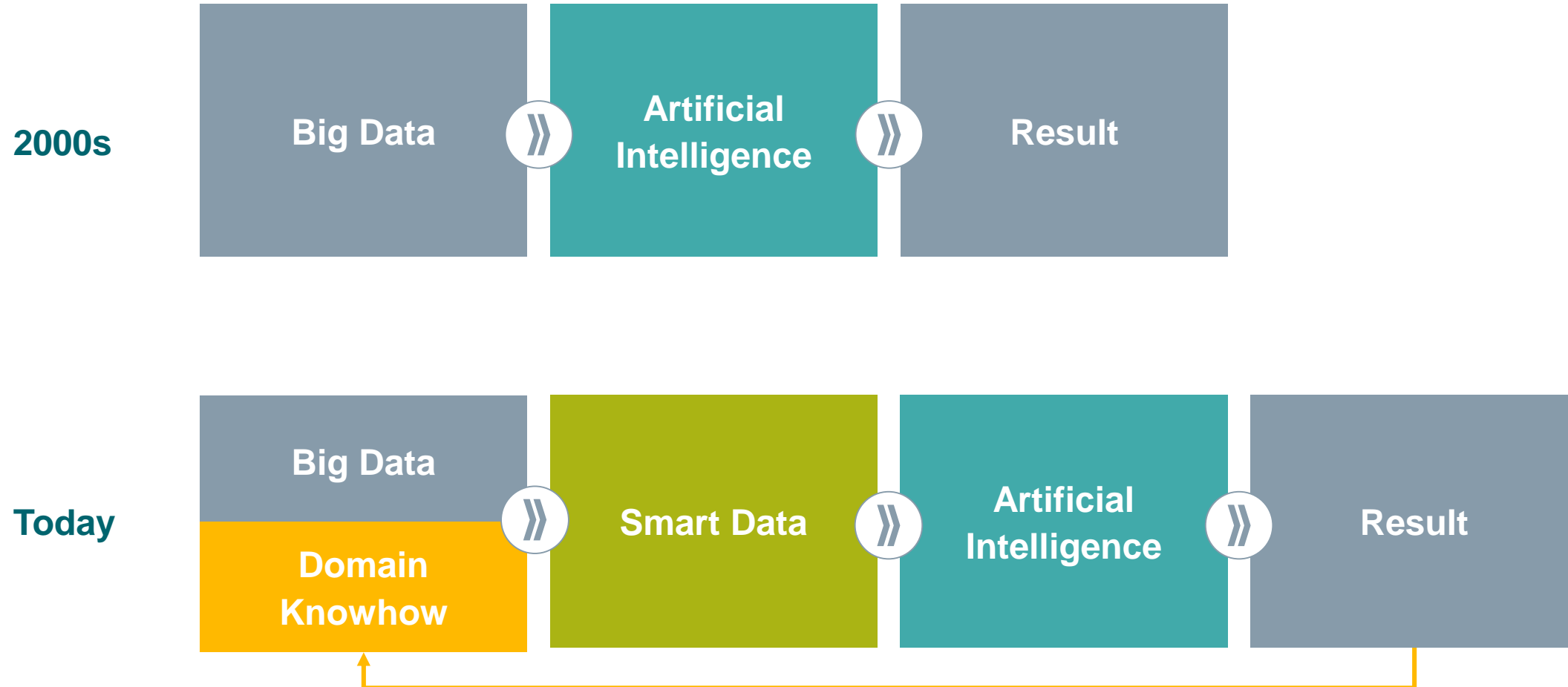
Today



Big data vs. smart data

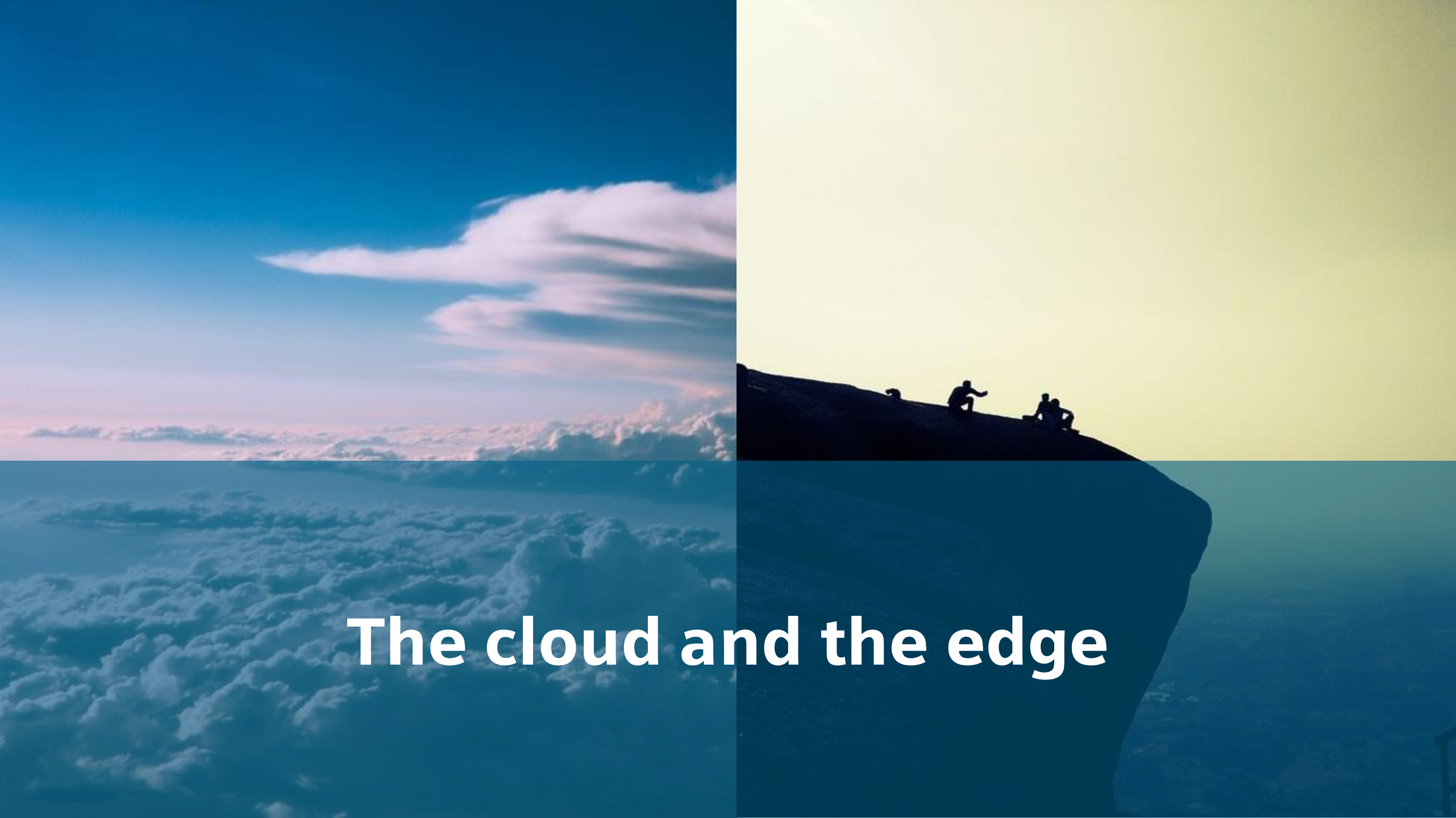


Big data vs. smart data





Skill #1: Work with the experts

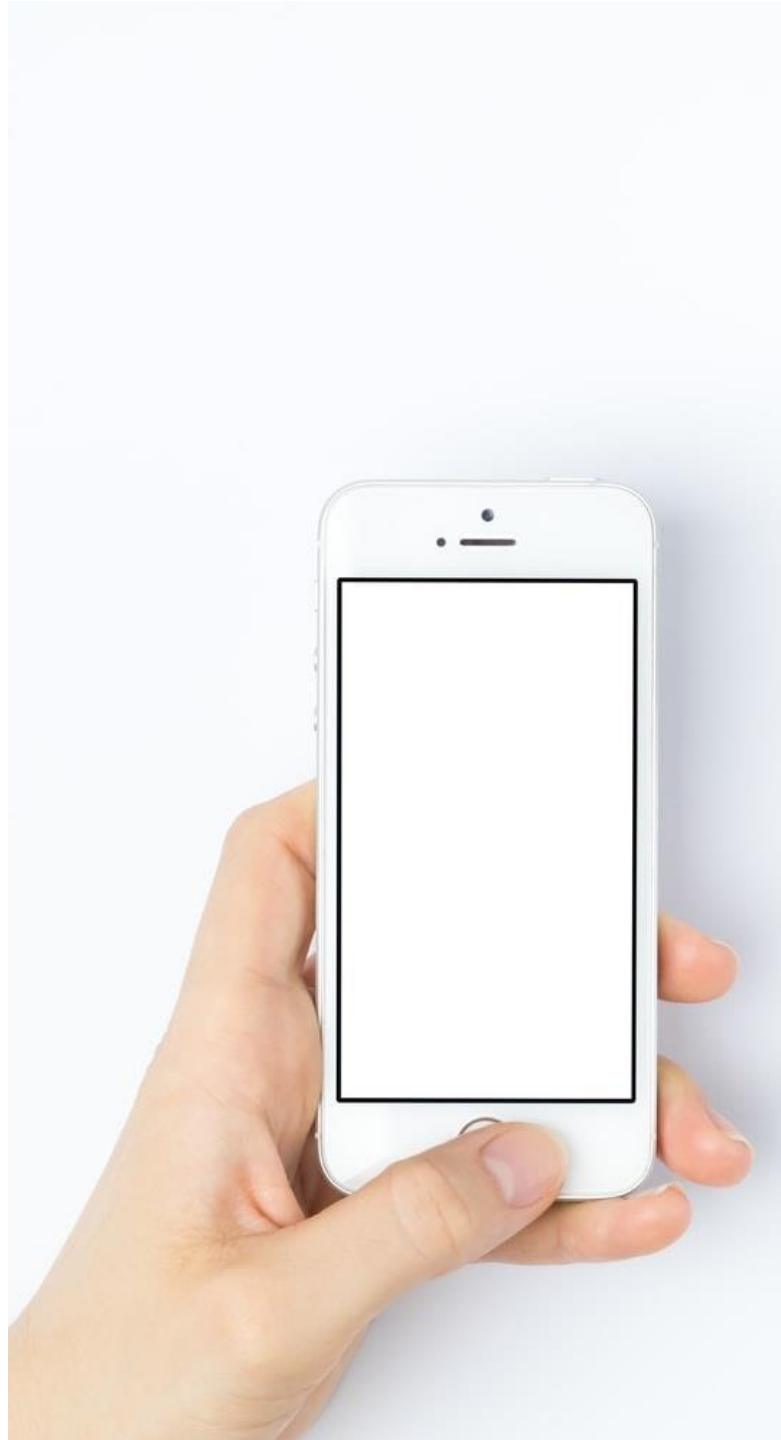


The cloud and the edge



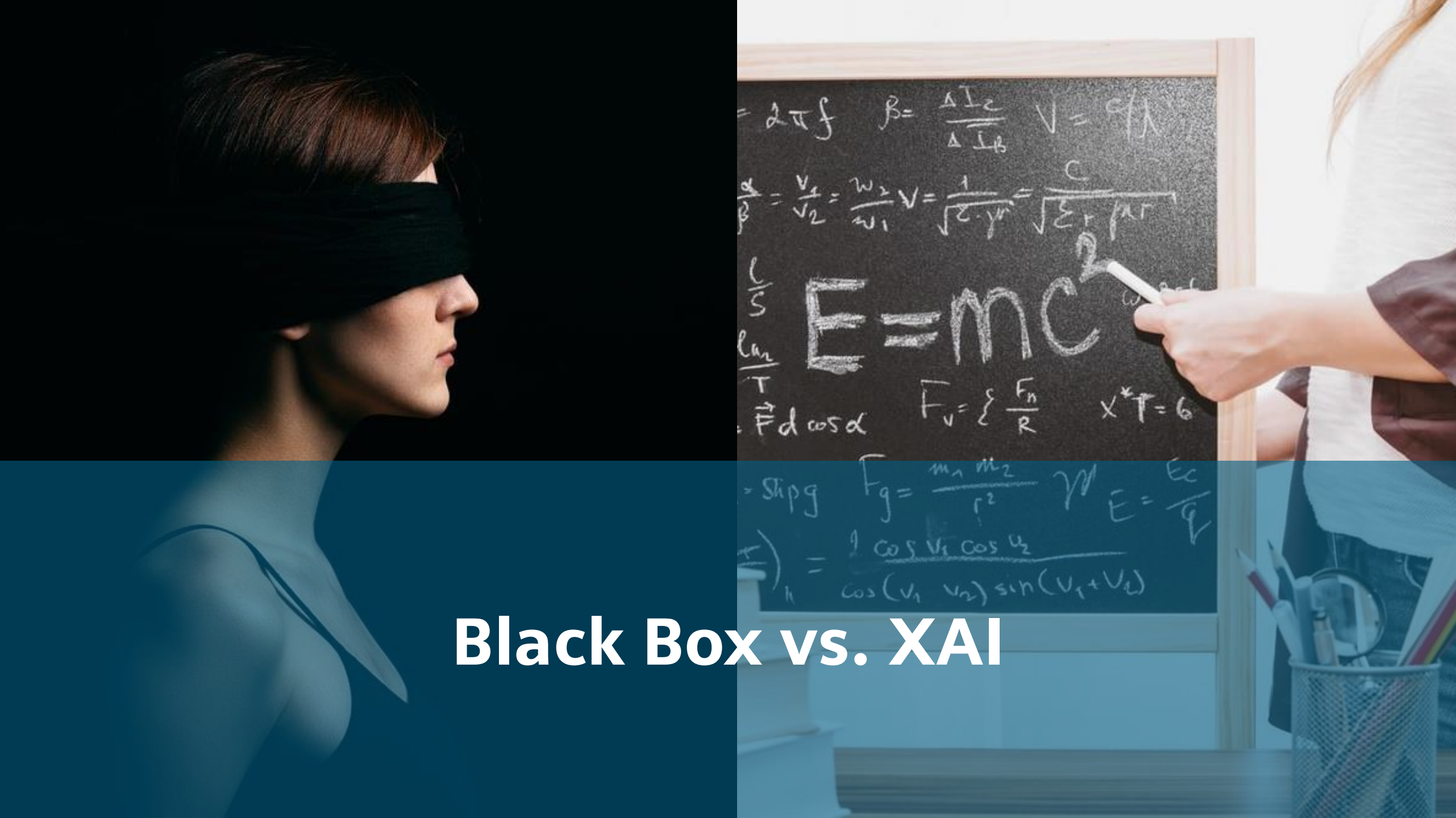








Skill #2: Select the right technology



$$2\pi f \quad \beta = \frac{\Delta I_c}{\Delta I_B} \quad V = \frac{c}{\lambda}$$
$$\frac{\alpha}{\beta} = \frac{v_1}{v_2} = \frac{w_2}{w_1} \quad v = \frac{1}{\sqrt{\epsilon \cdot \mu}} = \frac{c}{\sqrt{\epsilon_r \mu_r}}$$
$$\frac{c}{s} \quad E = mc^2$$
$$\frac{L_m}{T} \quad \vec{F} d \cos \alpha \quad F_v = \sum \frac{F_n}{R} \quad X^* T = 6$$
$$= \sin \theta \quad F_g = \frac{m_1 m_2}{r^2} \quad \gamma \quad E = \frac{Ec}{q}$$
$$\frac{F}{\mu} = \frac{\cos \theta_1 \cos \theta_2}{\cos(\theta_1 - \theta_2) \sin(\theta_1 + \theta_2)}$$

Black Box vs. XAI

“Asking for interpretability as a condition for real world usages is **undermining the foundations** of the whole field. If the trained model has good performances and **it's not interpretable we are probably on the right track**; if it's interpretable (and the explanation is understandable and replicable) **why loosing weeks and GPU power? Just write some if-else clauses.**”

Massimo Belloni, Data Scientist at HousingAnywhere
in his medium post from April 30th, 2019,
"If it's interpretable, it's pretty much useless"

“AI systems and their decisions should be **explained** in a manner adapted to the stakeholder concerned. Humans need to be aware that they are interacting with an AI system, and must be **informed of the system’s capabilities and limitations.**”

European Commission High-Level Expert Group on AI
in their "Ethics Guidelines for Trustworthy AI"
from April 8th, 2019,



Skill #3: Select the appropriate model



**Let's put this to practice
Sand and Dust prediction**







Skill #1

What do I know about Sand? How often do pathways get blocked? How critical is it really?

Skill #2

Who exactly and how is our customer going to be working with our solution?

Skill #3

How critical are prediction results? Life-and-death situation for involved humans? State regulated?



**Don't forget
the experts**



**Have the end
user in mind**



**Sexy doesn't
always win**

“When considering how IoT can transform your organization, remember that the **business is more important than the technology**. The technology might be exciting and new, but it must serve the business, not the other way around. When investigating the ROI of an IoT initiative, the IoT solution determines the invest, and **the business problem determines the potential return.**”

Siemens IOT Services

in their whitepaper (in print)

"Introducing IOT pays off – fact or fiction?"



Any questions?

Contact us!

SIEMENS
Ingenuity for life



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