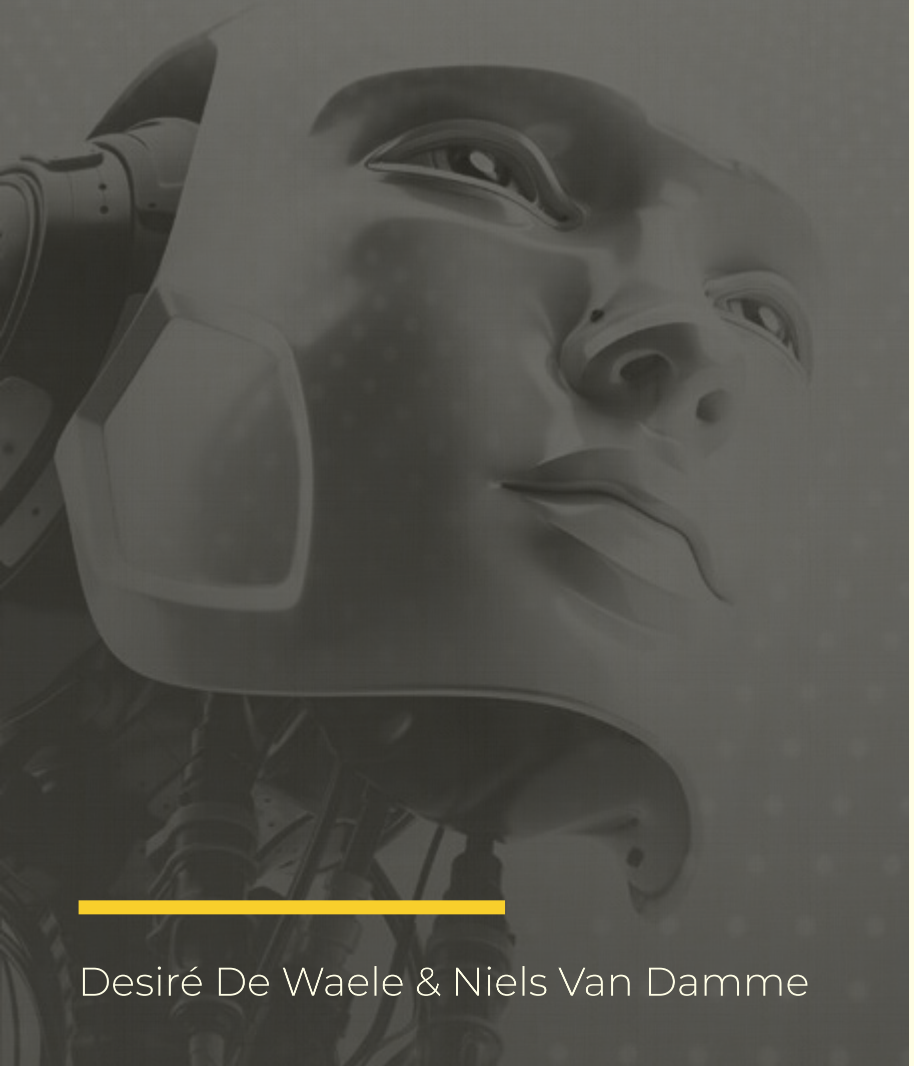
DESIRÉ DE WAELE - NIELS VAN DAMME

AI IN MY ORGANIZATION

WHAT. WHY. HOW.

Intro



Desiré De Waele & Niels Van Damme

OBJECTIVE

- To fill the gap between hype and reality about AI.
- To offer concrete steps to introduce AI.

WHO ARE WE

Two AI enthusiasts and autodidacts.

Outline

I. WHAT IS AI?

Definition - Self-learning Component - AI framework

II. WHY INTRODUCE AI?

Added Value - End-to-end Automation - Accessibility

III. HOW TO INTRODUCE AI?

Identify Use Cases - Talent resources - Project roadmap

Desiré De Waele & Niels Van Damme

WHAT MATERIALS DO WE OFFER?

PLAYBOOK

Written version of the contents, in 20-paged document.

WEBSITE

Landing page with all necessary information.

learnfromdata.ai/workshop

CURRICULUM

Technical material to teach your very own AI resources.

Part one. What is ai?

FUNCTIONAL DEFINITION

SELF-LEARNING COMPONENT

AI FRAMEWORK

Desiré De Waele & Niels Van Damme

Two things are considered AI

Artificial General Intelligence	Artificial Narrow Intelligence
Machines that resemble human intelligence or have a consciousness	Machines that are capable to perform one complex task well

Machines can be robots, computers, software, etc.

"AGI is science-fiction, ANI is changing the world."

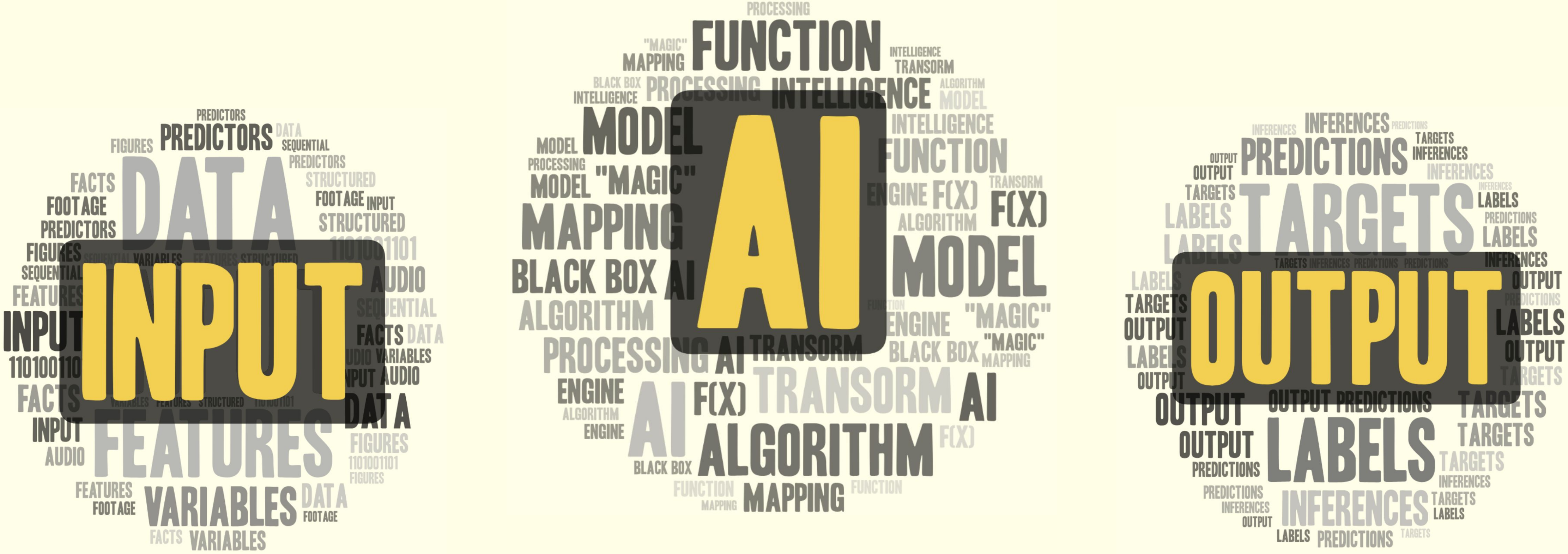
ANI performs tasks by transforming an input to an output.

Examples of ANI systems

INPUT	A(N)I	OUTPUT
Emails	Spam filtering	Spam/no spam
Audio data	Speech recognition	Transcriptions
English	Machine translation	Chinese
User information	Ad click prediction	Ad click/no click
Footage, radar info	Self-driving cars	Steer, accelerate, etc.
Images of machines	Visual inspection	Broken/not broken

Transforming input to output

Varying domain terminology boils down to…



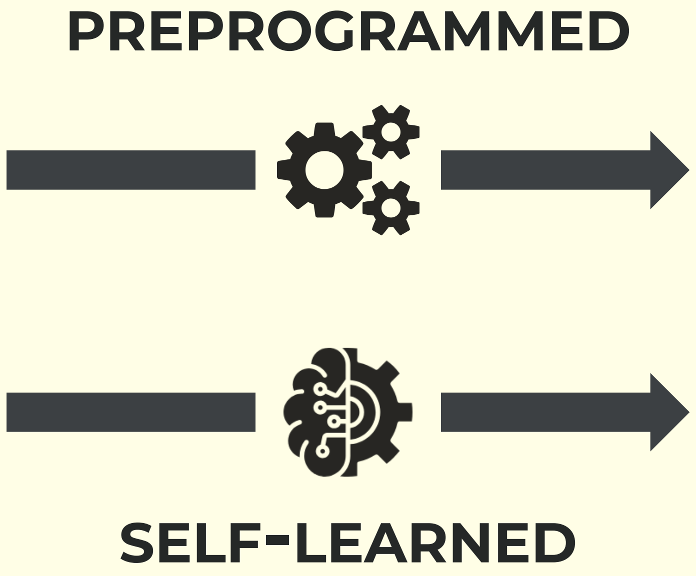
Desiré De Waele & Niels Van Damme

Two ways to transform input

Self learning component is arguably inherent to AI

INPUT

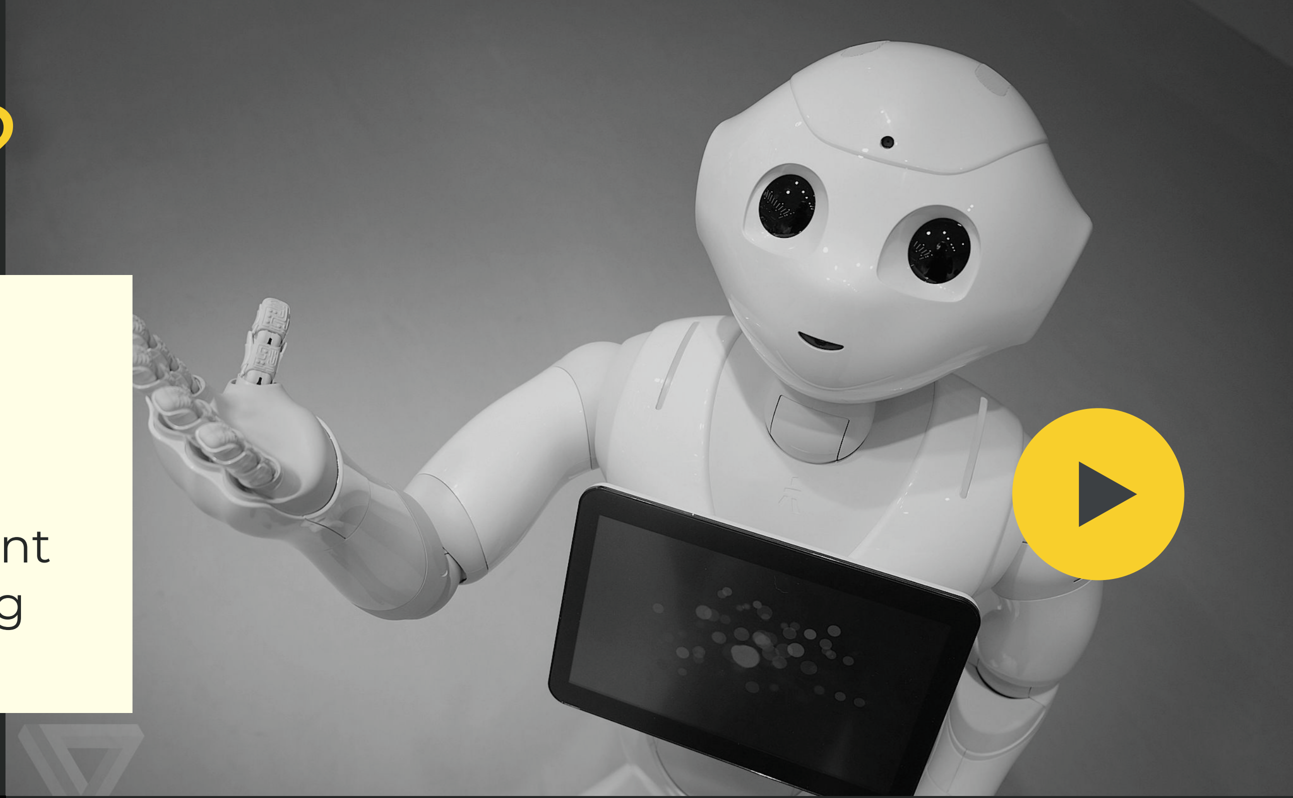
Emails
Audio data
English
User information
Footage, radar info
Images of machines



OUTPUT

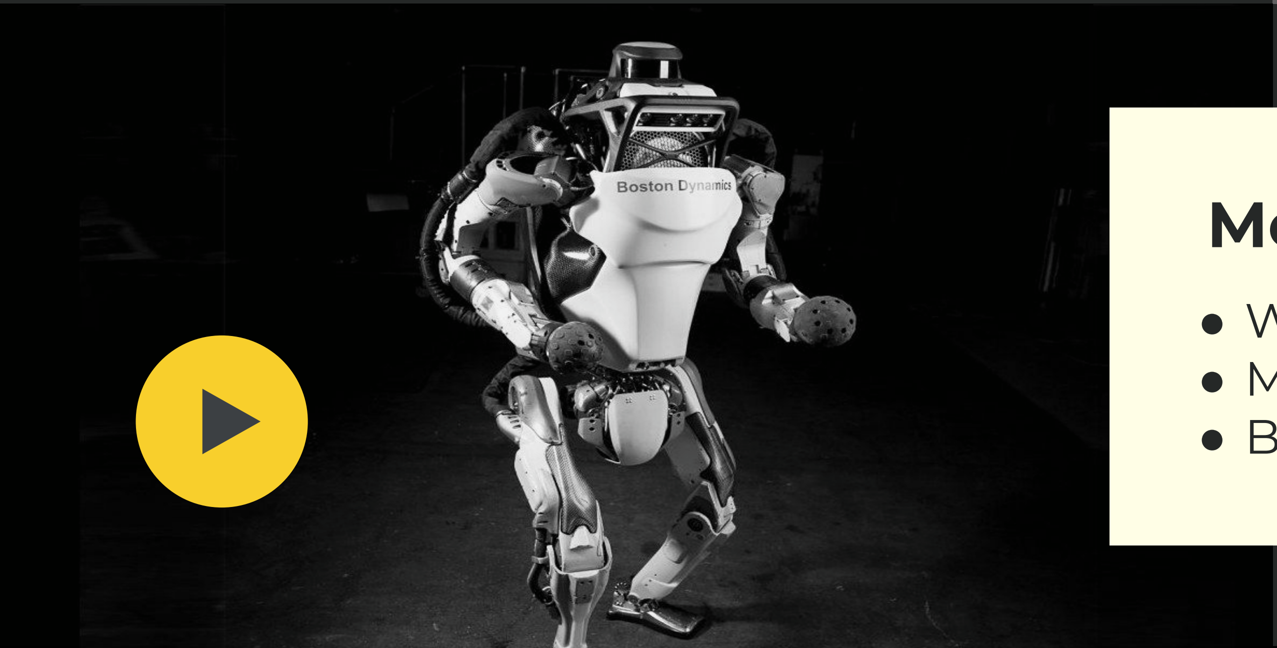
Spam/no spam
Transcriptions
Chinese
Ad click/no click
Steer, accelerate, etc.
Broken/not broken

Preprogrammed AI?



Meet Pepper

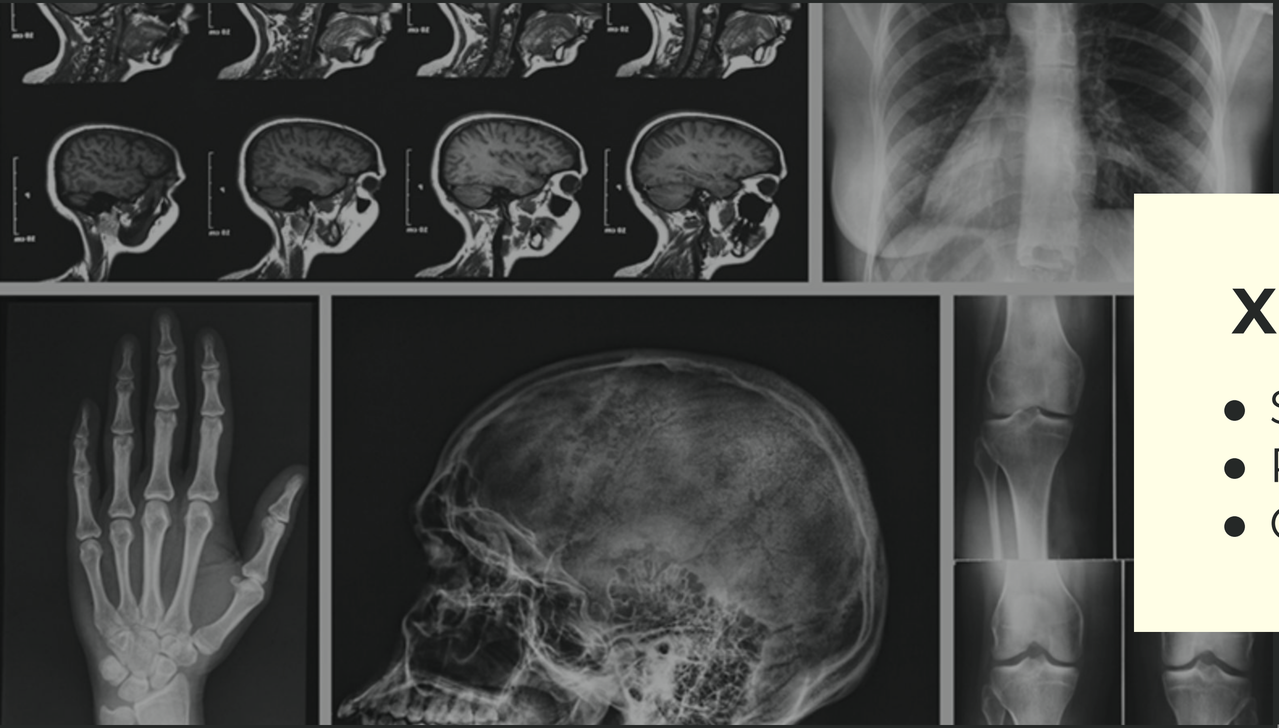
- Makes conversation, guides people
- Is seen as AI example, in- & output are present
- But is pre-programmed and not self learning



Meet Atlas

- Walks, runs, jumps, performs backward saltos
- Must be AI as well? In- & output are present
- But is highly pre-programmed too

Self-learning AI?



X Ray Readings

- Scans are screened for various diagnoses.
- Performed by a team of experienced doctors.
- Or performed by a self-learning algorithm.

Bank Loan Approvals

- Loan applications are screened for approval.
- Performed manually based on data.
- Or performed by a self-learned algorithm.

Gain intuition in how AI learns

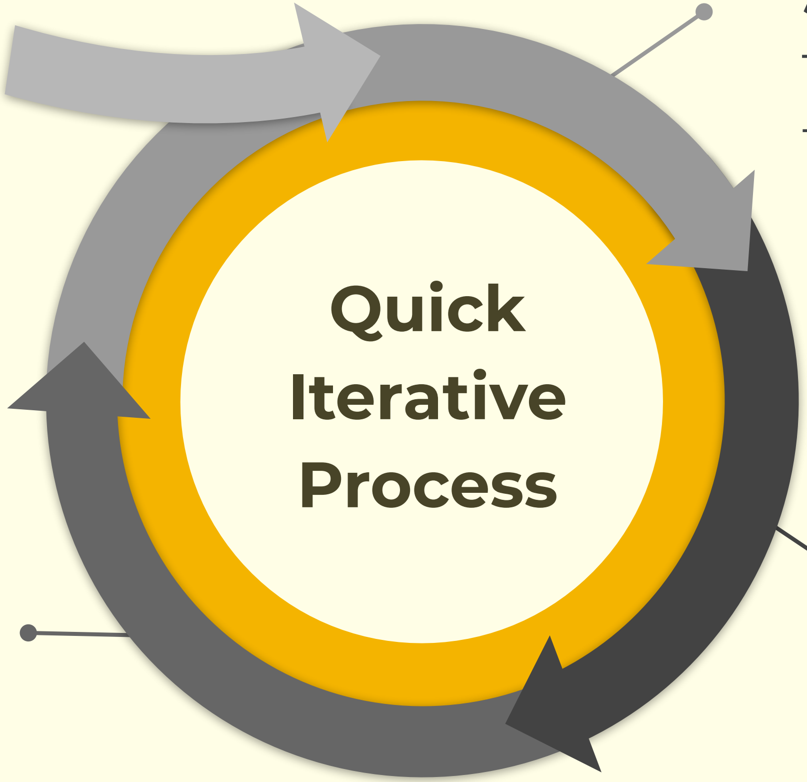
Iterative steps an AI system learns by

Step 0: *Initialization*

A random transformation from input to output gets initiated.

Step 1: *Transformation*

The transformation is applied on the input, resulting in an output.



Step 2: *Evaluation*

The output is evaluated by how far off it is from performing the task well.

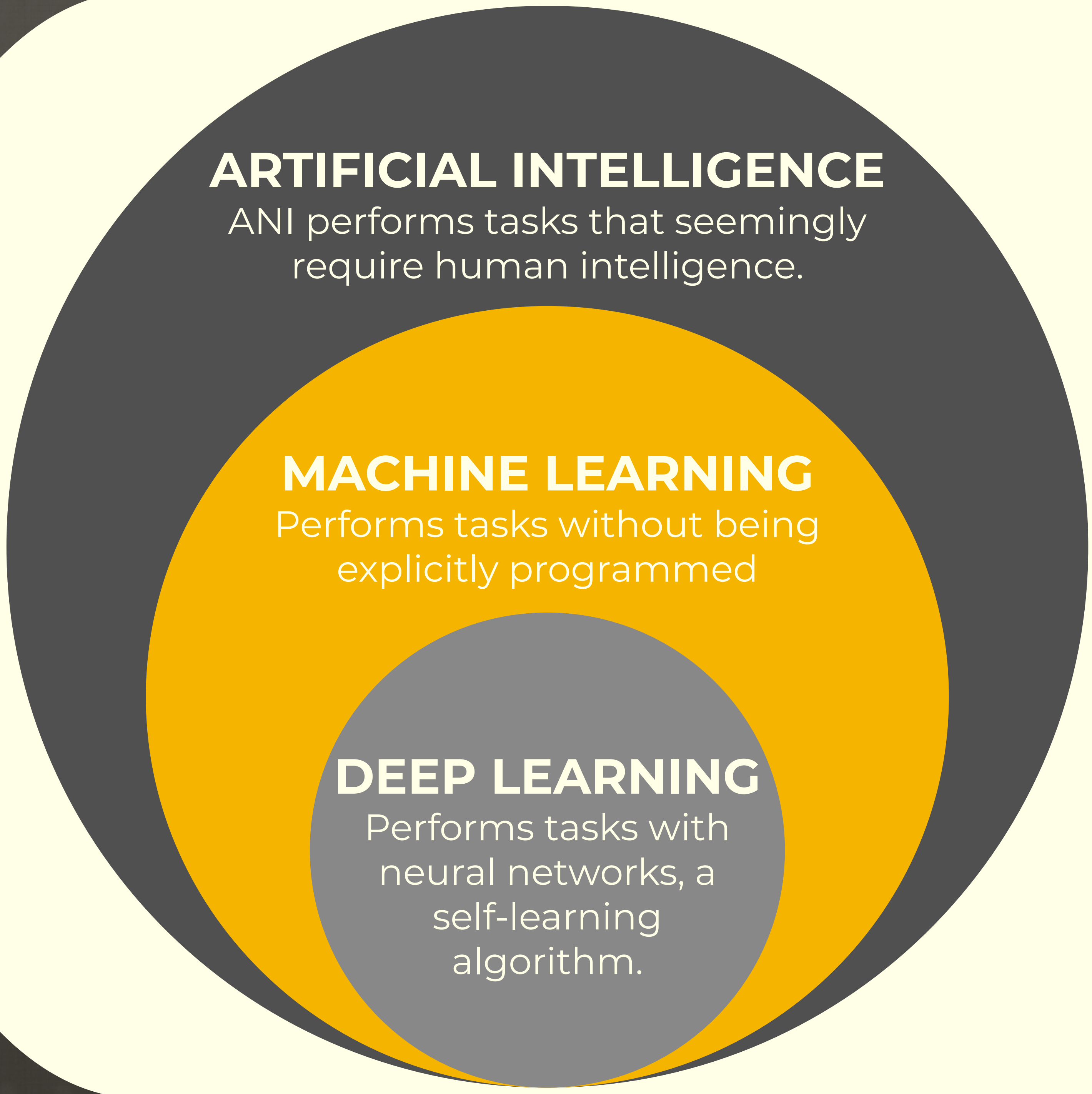
Step 3: *Tuning*

The transformation is slightly changed in each step, towards a slightly better performance.

AI DECOMPOSED

Three buzzwords explained

Desiré De Waele & Niels Van Damme



Technical subcategories of AI

Supervised Learning

INPUT **OUTPUT**

AI that tries to find relationships between a known input and output.

Unsupervised Learning

INPUT **OUTPUT**

AI that tries to find relationships within a known input only.

Reinforcement Learning

INPUT **OUTPUT**

AI that tries to generate an input to reach a known output.

Technical subcategories of AI

Supervised Learning

INPUT | OUTPUT

MACHINE TRANSLATION

“She rode her bicycle”

她騎著自行車

Unsupervised Learning

INPUT | OUTPUT

CLUSTERING

Reinforcement Learning

INPUT | OUTPUT

SKILL LEARNING

QUESTIONS?

Desiré De Waele & Niels Van Damme

Part two. Why introduce AI?

ADDED VALUE

VIRTUOUS CIRCLE OF AI

END-TO-END AUTOMATION

ACCESSIBILITY OF AI

Desiré De Waele & Niels Van Damme

Added Value

Reasons to prefer DL over other input transformations

Superior in performance

DL generalizes other algorithms & tends to perform better

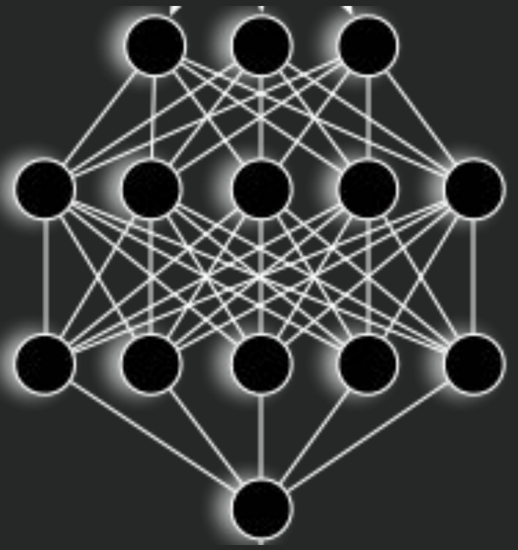
Scales to big data

DL algorithms can spot patterns in big data especially.

Input melting pot

Structured data, image data, sequential data… can be combined with less human intervention needed.

Advantages



Added Value

Pseudo reasons to prefer other input/output transformations over DL

Explainability

DL tends to be black box, but this area of DL is growing

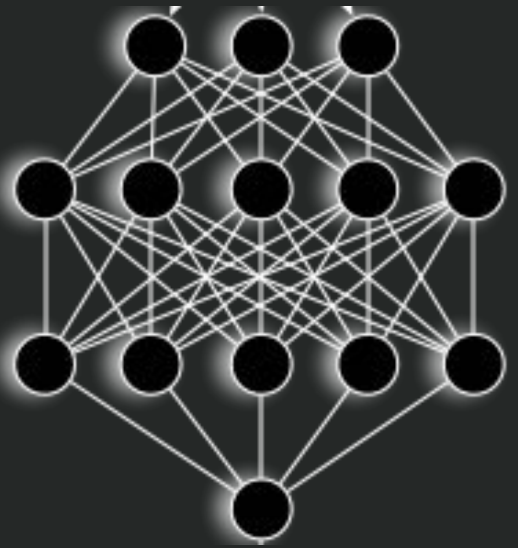
Computationally Intensive

DL requires computations which are heavy, but feasible

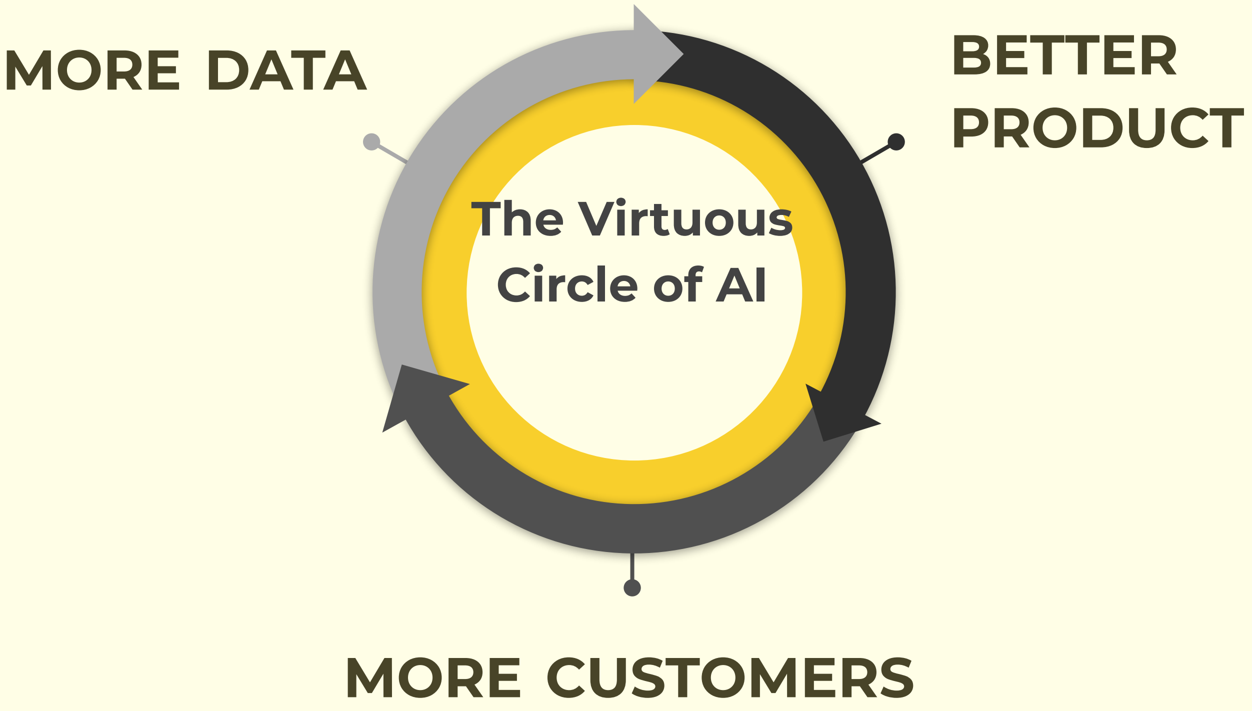
Not yet widespread

It takes effort to get your scientists up to speed

Pseudo-Disadvantages



The Virtuous Circle of AI

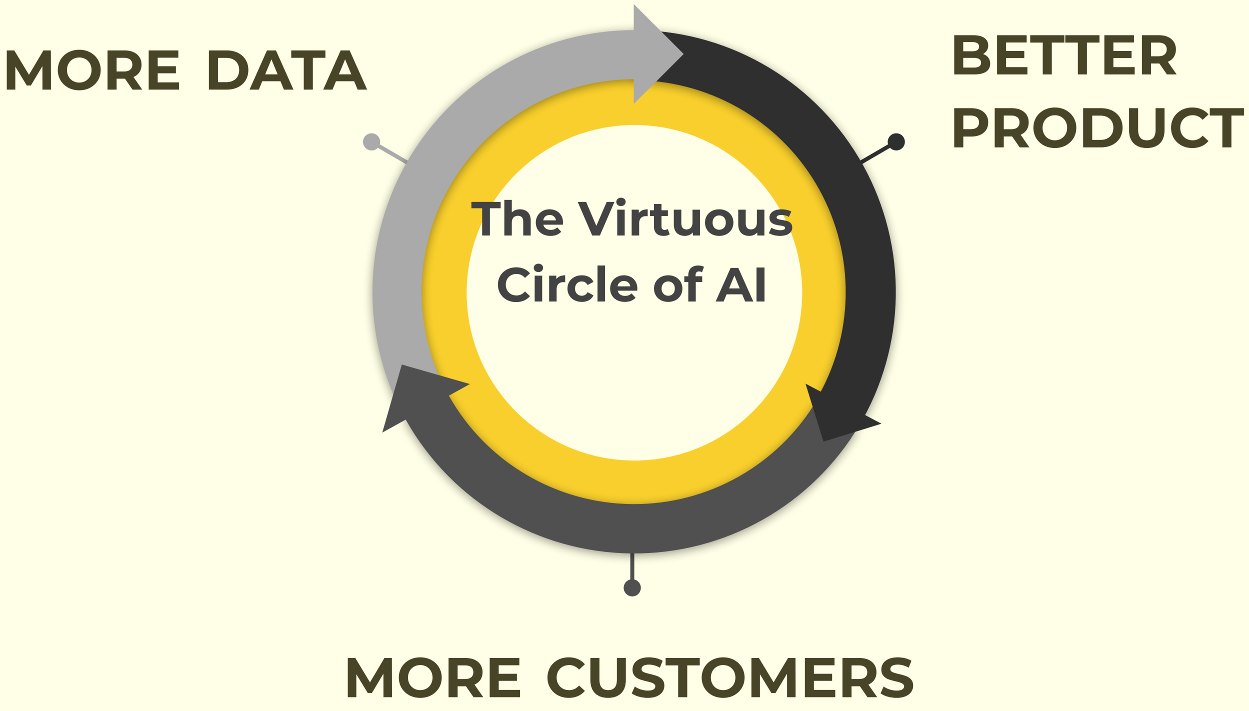


Get the wheel turning as quickly as possible, in your specialized, vertical, domain.

Do NOT compare yourself with Google, Microsoft, Amazon, etc.

Desiré De Waele & Niels Van Damme

The Virtuous Circle of AI



Companies that managed to get the wheel turning:

AB-InBev *uses cash registration data to predict beer sales.*

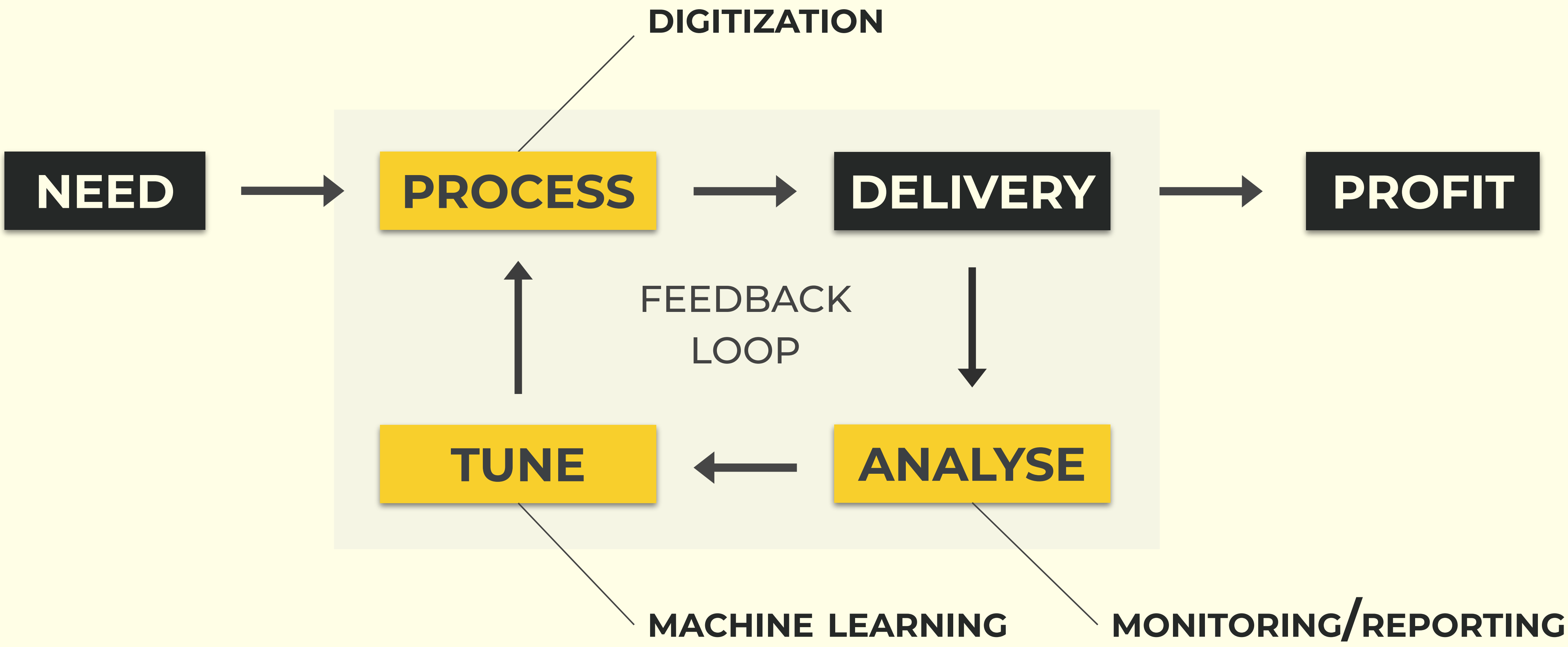
Foodpairing *matches ingredients to find new recipes for chefs.*

Iceberg sport's analytics *predicts performance based on athletes' data.*

Desiré De Waele & Niels Van Damme

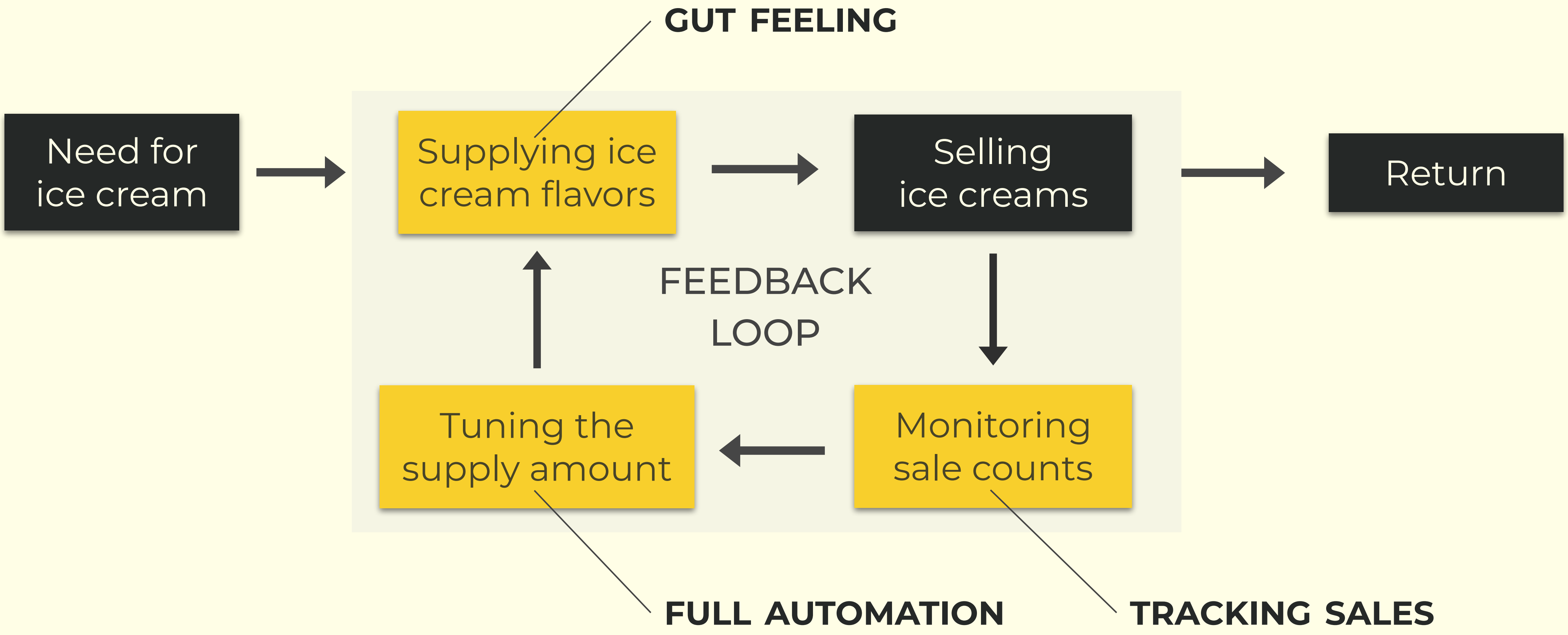
End-to-end Automation

Automating the process, the analysis AND the tuning



End-to-end Automation

Ice cream truck example



ACCESSIBILITY OF AI

BETTER HARDWARE

Hardware availability is a big factor in the scalability of ML applications.

MOORE'S LAW

Hardware doubles in capacity every 18 months

RISE OF GRAPHIC CARDS

GPU's allow for performant DL computing

CLOUD COMPUTING

High tech companies offer cheap hardware

ACCESSIBILITY OF AI

DATA GENERATION

We will be generating 163 ZB* data per year in 2025

INTERNET OF THINGS

True revolution is data generation, over remote control

DATA MONETIZING

Data is being traded as a product, or open-sourced

BIG DATA

Data is the fuel that drives deep learning applications.

*1 ZB or ZettaByte is a billion Terabytes

ACCESSIBILITY OF AI

BETTER ALGORITHMS

Although neural networks exist a long time, breakthroughs are emerging rapidly.

NEURAL NETWORKS EXIST SINCE THE 50's

Coined in 1958 by psychologist Frank Rosenblatt

BETTER ALGORITHMS EMERGED RECENTLY

LSTM's, GRU's etc. are proposed by recent papers

CONTINUOUS BREAKTHROUGHS

Many things are yet to be discovered

ACCESSIBILITY OF AI

PYTHON

"Deep Learning has chosen Python"

TENSORFLOW

Developed and backed by Google for ML purposes

KERAS

High level software on top of tensorflow

BETTER TOOLING

Low level coding makes way for accessible, high level software and tools.

QUESTIONS?

Desiré De Waele & Niels Van Damme

PART THREE. HOW TO INTRODUCE AI?

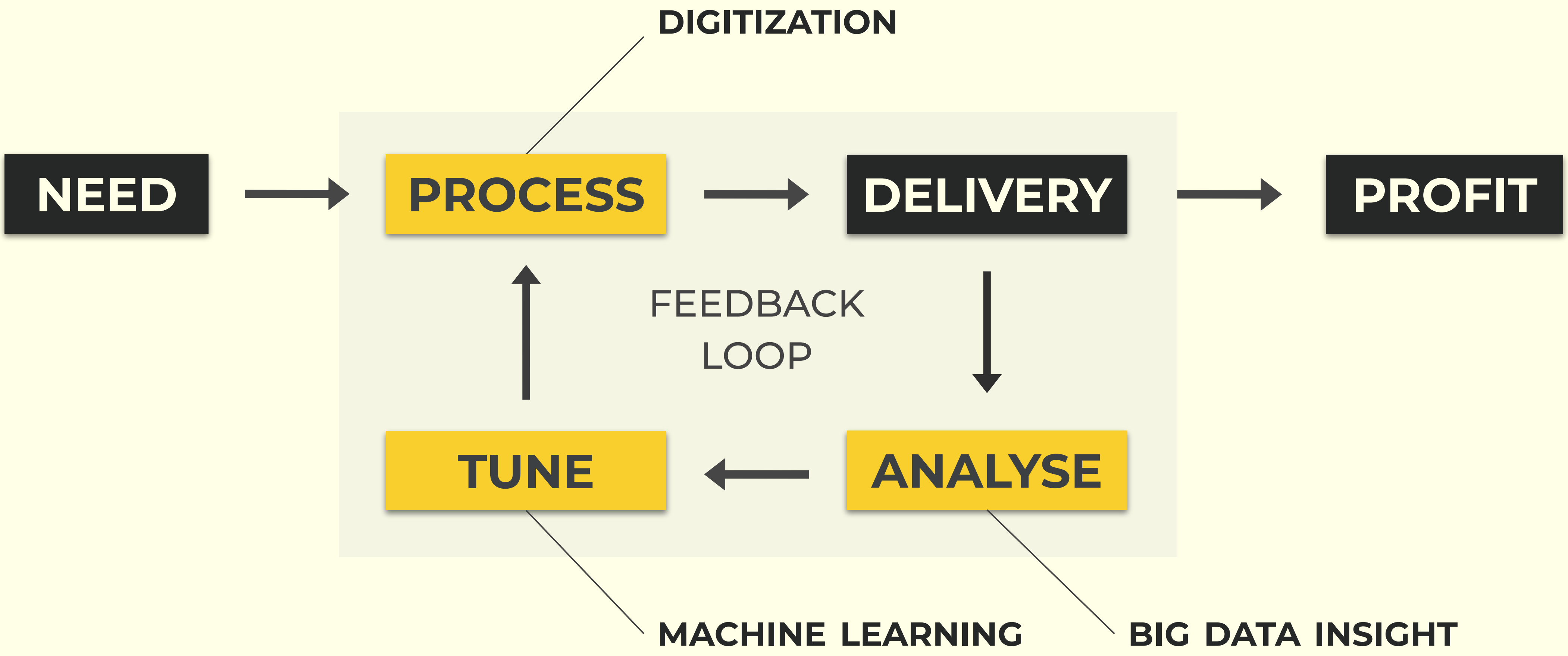
IDENTIFY USE CASES

TALENT RESOURCES

PROJECT ROADMAP

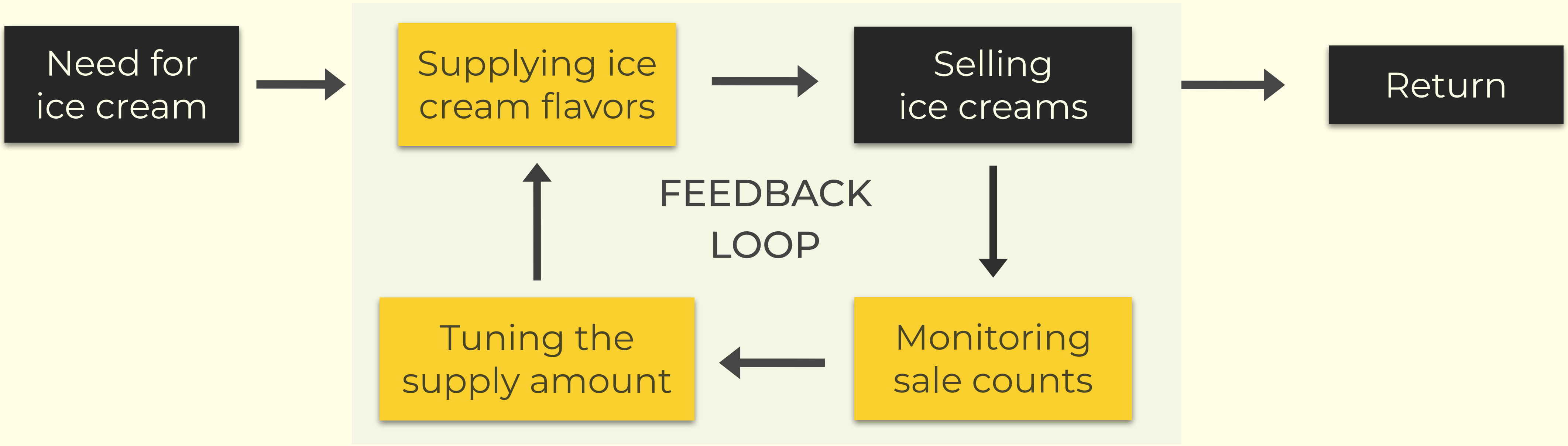
Desiré De Waele & Niels Van Damme

Identify Potential Use Cases



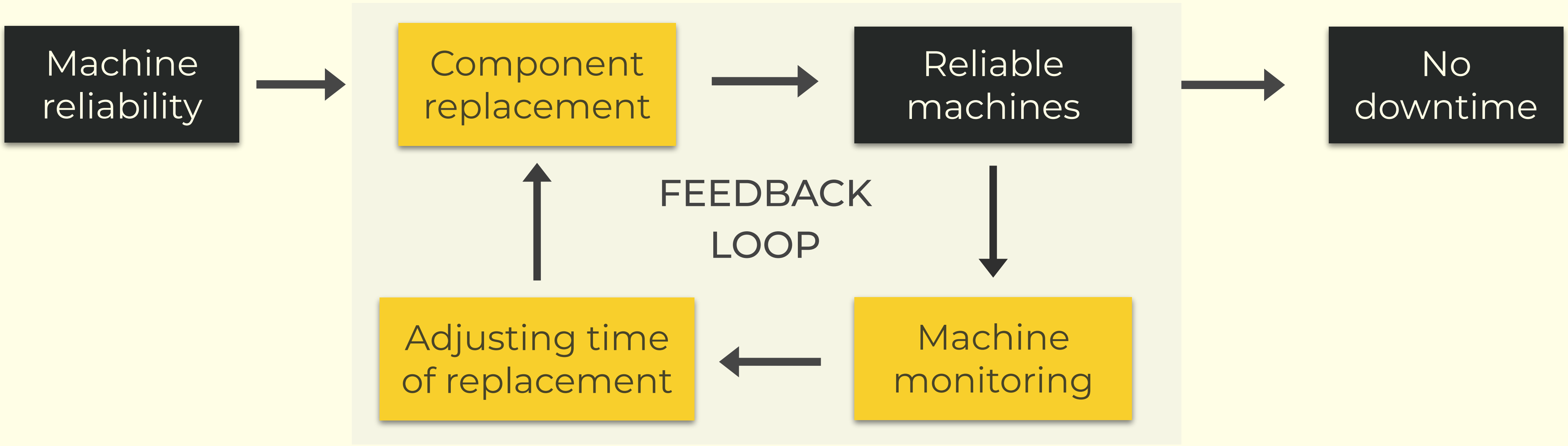
Identify Potential Use Cases

Ice cream truck example



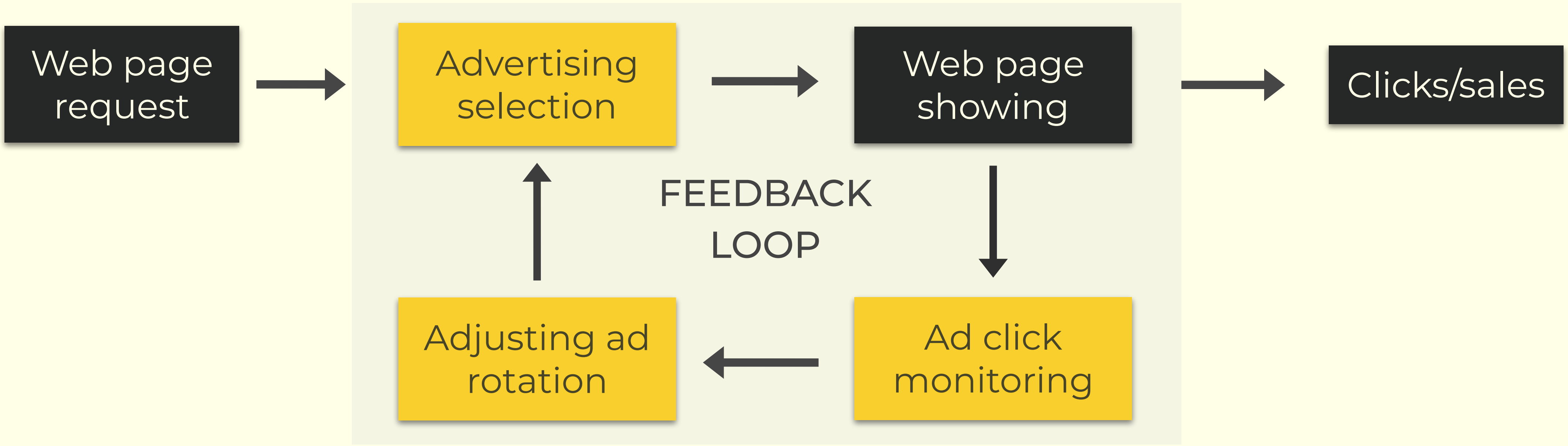
Identify Potential Use Cases

Machine maintenance example



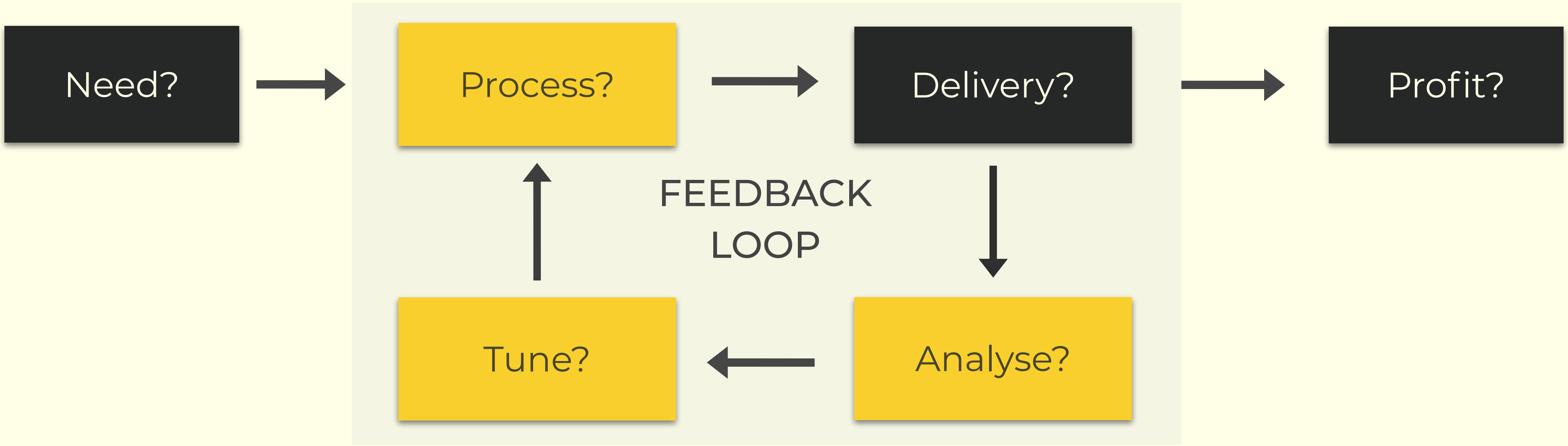
Identify Potential Use Cases

Online advertising example



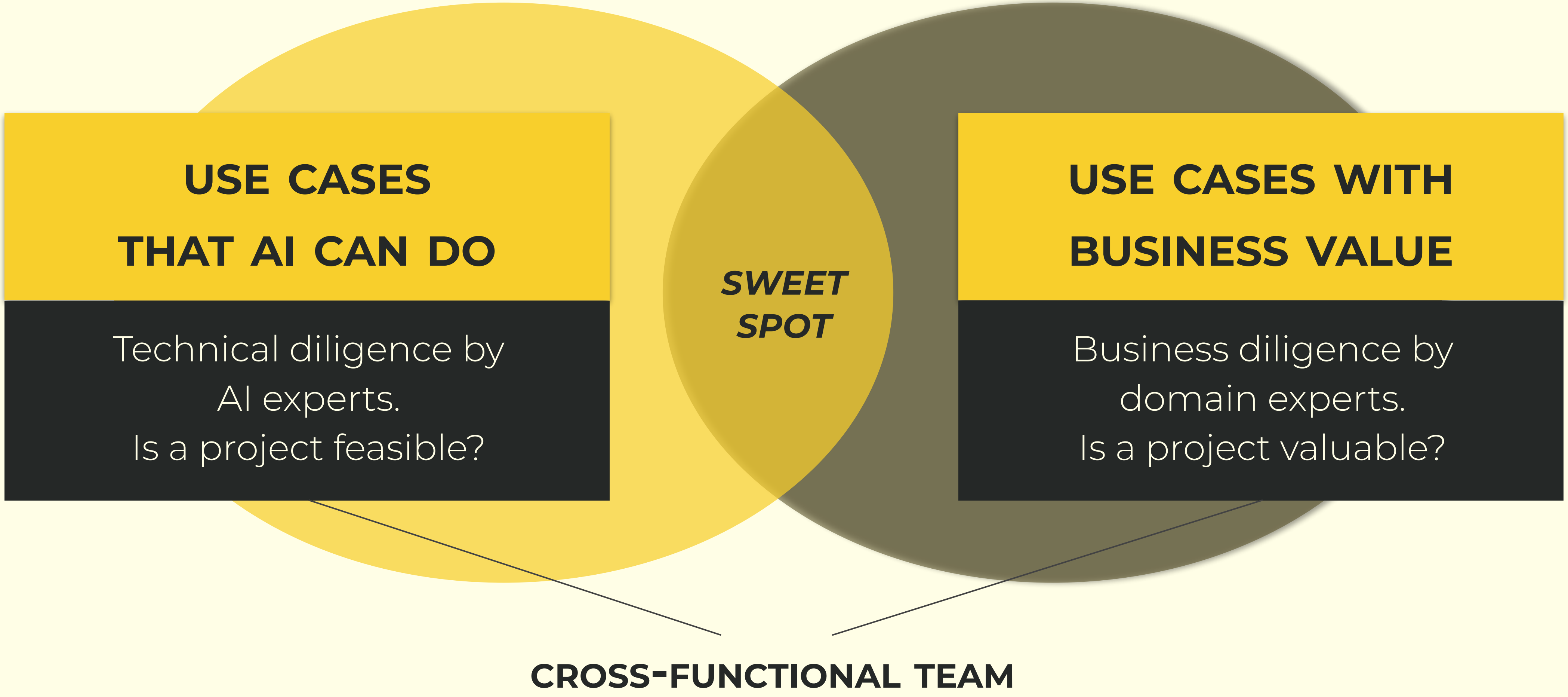
Identify Potential Use Cases

Your turn!

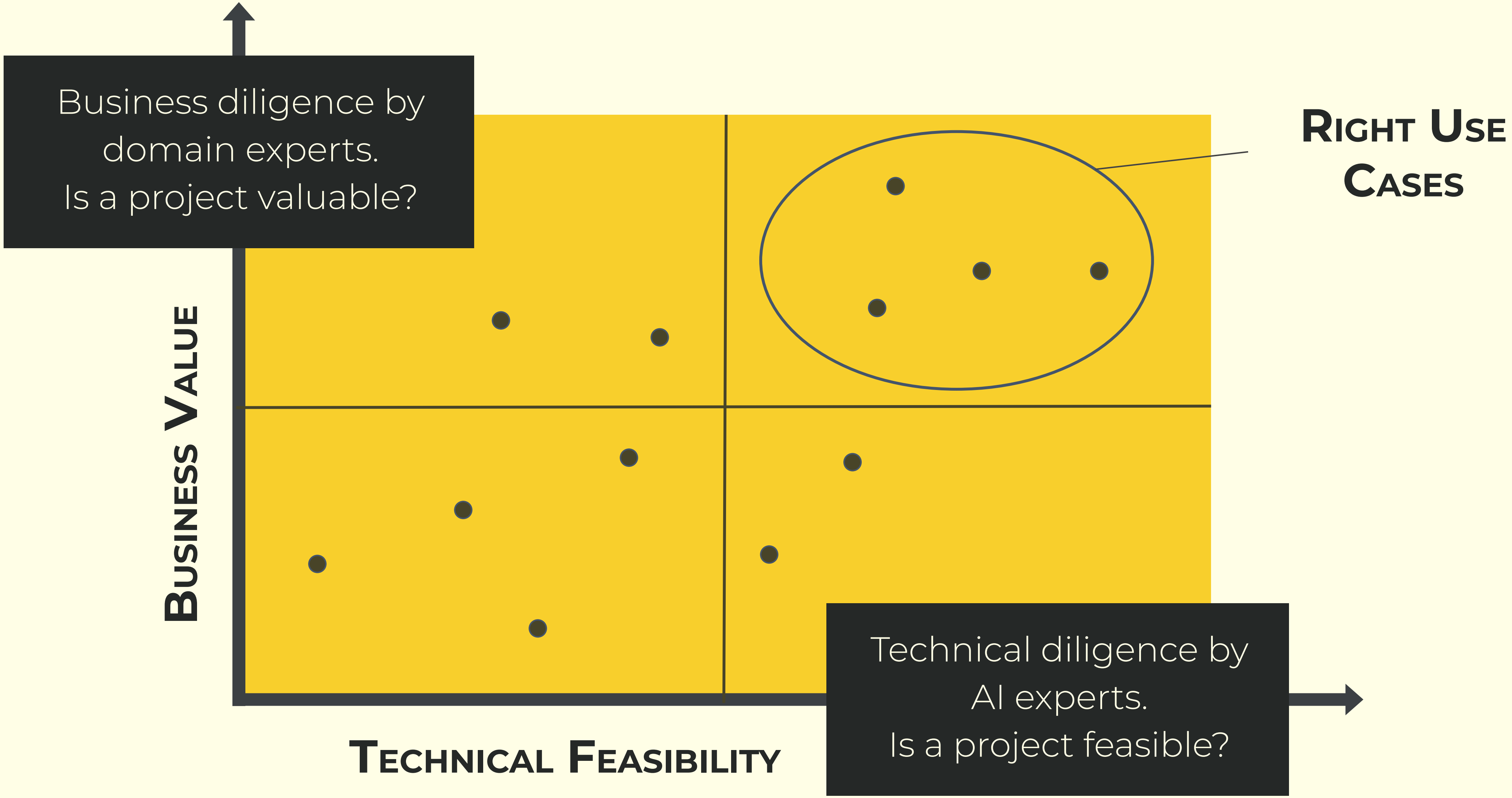


Desiré De Waele & Niels Van Damme

Identify the Right Use Cases



Identify the Right Use Cases



HOW TO BUILD RESOURCES

From an AI perspective

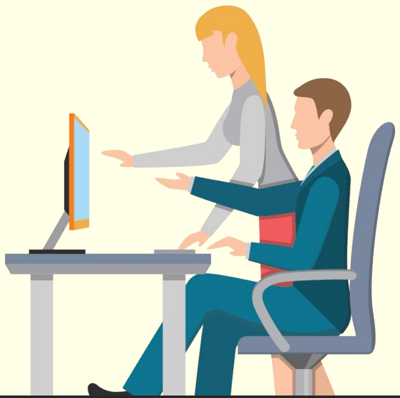
TECHNICAL CURRICULUM

Develop your own, or use the one we propose

Desiré De Waele & Niels Van Damme

Hiring or teaching - AI considerations

TEACH AI talent



Digital AI education

- Highly available for AI
- Changes dynamically
- Centered skill set in AI
- Pragmatically oriented

HIRE AI talent

Academic AI education

- Slowly emerging for AI
- Changes statically
- Broad skill set around AI
- Theoretically oriented

Develop a digital curriculum

"Don't create, but curate"

Everything is out there, don't reinvent the wheel.

Aim for a uniform skill set

Resources acquire the same proficiencies.

Current industry standards

Digital content is up to date and made by industry experts.

Or use our curriculum

FROM SCRATCH TO PROFESSIONAL IN UNDER 500 HOURS

Starting from zero skills, to applying AI professionally.

PEOPLE GET IN AT THEIR LEVEL

Often, people have a skill set and don't start from scratch.

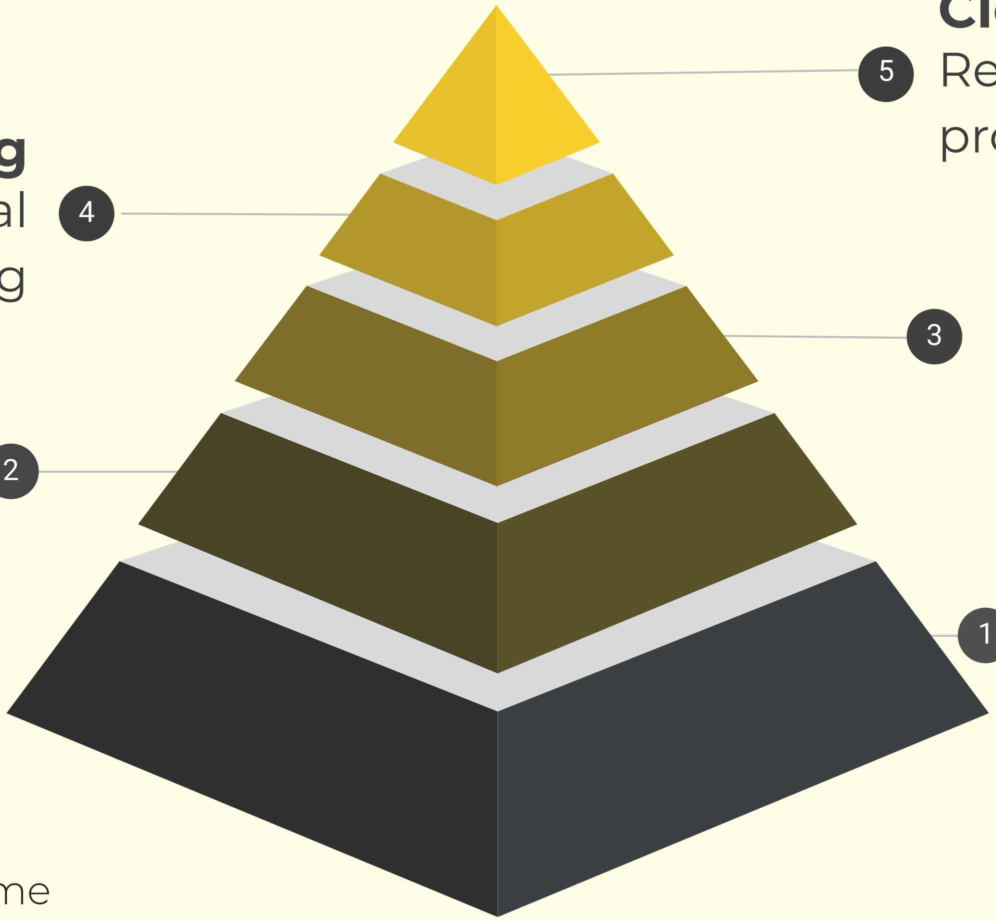
CAN BE AN ACCEPTANCE REQUIREMENT

*MOOCS** offer certificates upon completion.

*Massive Open Online Course

DIGITAL CURRICULUM

Five components for end-to-end machine learning



5 **Cloud Computing**
Remote control, scalable processing

4 **Machine Learning**
Deep learning, traditional machine learning

3 **Data Science**
Preprocessing, wrangling, analysis, visualization

2 **Math & Statistics**
Algebra, Calculus, PCA, Inferential statistics

1 **Programming**
Scripting, Object Oriented Programming

Desiré De Waele & Niels Van Damme

DIGITAL CURRICULUM

Five components for end-to-end machine learning

		Skills	Tooling
01	Programming	Scripting, Object Oriented Programming	Python, SQL, Bash, Git
02	Math & Statistics	Algebra, Calculus, PCA, Inferential statistics	-
03	Data Science	Preprocessing, wrangling, analysis, visualization	Jupyter, Numpy, Pandas, Plotly
04	Machine Learning	Deep learning, traditional machine learning	Sklearn, Tensorflow, Keras, Pytorch
05	Cloud Computing	Collaboration, remote control, scalable processing	GCP, AWS, Linux

DIGITAL CURRICULUM

01 Programming

Scripting, Object Oriented Programming — Python, SQL, Bash, Git

01	Python 3 Specialization	Coursera	Link	60 hours	43€

Five courses on Python fundamentals, data processing, scripting and classes/inheritance.

02	The Unix Workbench	Coursera	Link	15 hours	Free

Course on the command line interface. Independent IT language lying at the base.

03	SQL Beginner's Course	FreeCodeCamp	Link	4 hours	Free

Course on SQL, number one language for data retrieval.

04	Git Essential Training	LinkedIn	Link	6 hours	Free

Training on version control. Optimize workflow and collaboration.

DIGITAL CURRICULUM

02	Math & Statistics	Algebra, Calculus, PCA, Inferential Statistics	-			
01	Statistics Specialization	Coursera	Link	50 hours	43€	
	Three courses on data fundamentals, inferential statistics, and model fitting.					
02	Math for ML Specialization	Coursera	Link	60 hours	43€	
	Three courses on linear algebra, multivariate calculus and principal component analysis.					

DIGITAL CURRICULUM

03	Data Science	Data Preprocessing, wrangling, visualization	Jupyter, Numpy, Pandas, Plotly

01	Data Science Specialization	Coursera	Link	90 hours	43€

Five courses on data processing, visualization, text mining and machine learning.

02	Visualization with Plotly & Dash	Udemy	Link	20 hours	10€

Course on the number one open source visualization tool.

03	End-to-end Analysis Pipeline	Kaggle	Link	40 hours	Free

Pick three Kaggle datasets to perform analysis and report insight.

DIGITAL CURRICULUM

04 Machine Learning

Deep learning, traditional machine learning

Sklearn, Tensorflow, Keras, Pythorch

01	Deep Learning Specialization	deeplearning.ai	Link	80 hours	43€

Five courses on data processing, visualization, text mining and machine learning.

02	Machine Learning Yearning	deeplearning.ai	Link	20 hours	Free

Book with over 50 machine learning best practices that are short, practical and valuable.

03	End-to-end Modelling Pipeline	Kaggle	Link	40 hours	Free

Pick three Kaggle datasets (structured, visual, sequential) to build a model for prediction.

DIGITAL CURRICULUM

05	Cloud Computing	Collaboration, remote control, scalable processing	GCP, AWS, Linux

01	ML on Google Cloud Platform	Coursera	Link	80 hours	43€

Ten courses on data processing, visualization, text mining and machine learning.

02	ML on Amazon Web Services	Amazon	Link	20 hours	Free

PROJECT ROADMAP

A PROJECT MANAGER'S PERSPECTIVE

FIVE STAGES

From defining metrics to model deployment.

ROADMAP TIMELINE

Set the right expectations for your project.

Desiré De Waele & Niels Van Damme

PROJECT ROADMAP

Best practices from an AI perspective

DEFINE METRICS

Translate a business need into a measurable metric.

SETUP INFRASTRUCTURE

Create a working environment for machine learning.

COLLECT DATA

Get a hold on your input and output data.

MODEL BUILDING

Let AI do its magic and build the transformation.

DEPLOYMENT

Put it in use in a production environment.

Desiré De Waele & Niels Van Damme

PROJECT ROADMAP

Best practices from an AI perspective

DEFINE METRICS | SETUP INFRASTRUCTURE | COLLECT DATA | MODEL BUILDING | DEPLOYMENT

→ *Define a measurable metric*

→ *Split a metrics in various sub-metrics*

PROJECT ROADMAP

Best practices from an AI perspective

DEFINE METRICS · **SETUP INFRASTRUCTURE** · **COLLECT DATA** · **MODEL BUILDING** · **DEPLOYMENT**

→ *Have a cloud or local environment*

→ *Develop with reproducibility in mind*

PROJECT ROADMAP

Best practices from an AI perspective

DEFINE METRICS

SETUP INFRASTRUCTURE

COLLECT DATA

MODEL BUILDING

DEPLOYMENT

→ *Iterate quickly with subsamples*

→ *Consider present before absent data*

PROJECT ROADMAP

Best practices from an AI perspective

DEFINE METRICS

SETUP INFRASTRUCTURE

COLLECT DATA

MODEL BUILDING

DEPLOYMENT

➔ *Evaluate models asap, only then scale up*

➔ *Don’t keep fine tuning, do deliver with timeboxing*

PROJECT ROADMAP

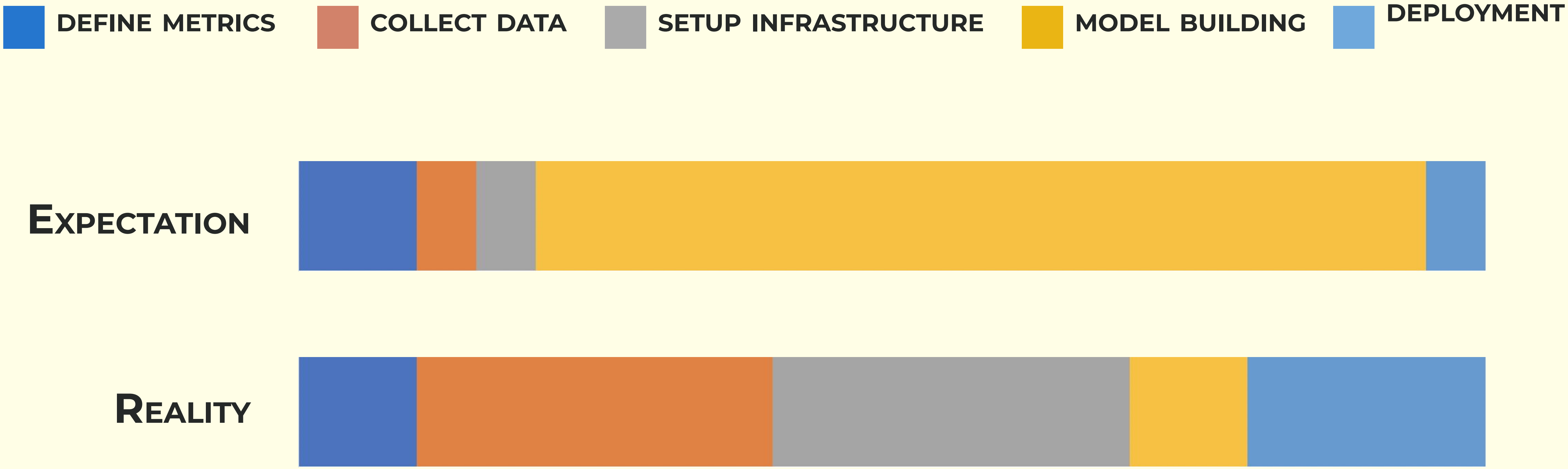
Best practices from an AI perspective

DEFINE METRICS — **SETUP INFRASTRUCTURE** — **COLLECT DATA** — **MODEL BUILDING** — **DEPLOYMENT**

→ *Benefit from reproducibility*

→ *Evaluate models before and after deployment*

ROADMAP TIMELINE



Desiré De Waele & Niels Van Damme

Best practices

Gain Momentum

Get the ball rolling with a medium sized project, having a high success probability

START WITH A SMALL TO MIDDLE SIZED PROJECT

Big enough to be noticed, without taking high risks.

ENSURE A HIGH SUCCESS PROBABILITY

It will act as a reference for future projects.

CAN BE IN- OR OUTSOURCED

Only goal is to get the ball rolling, remove AI scepsis.

Three Takeaways

I. IDENTIFY USE CASES

By systematically listing potential feedback loops

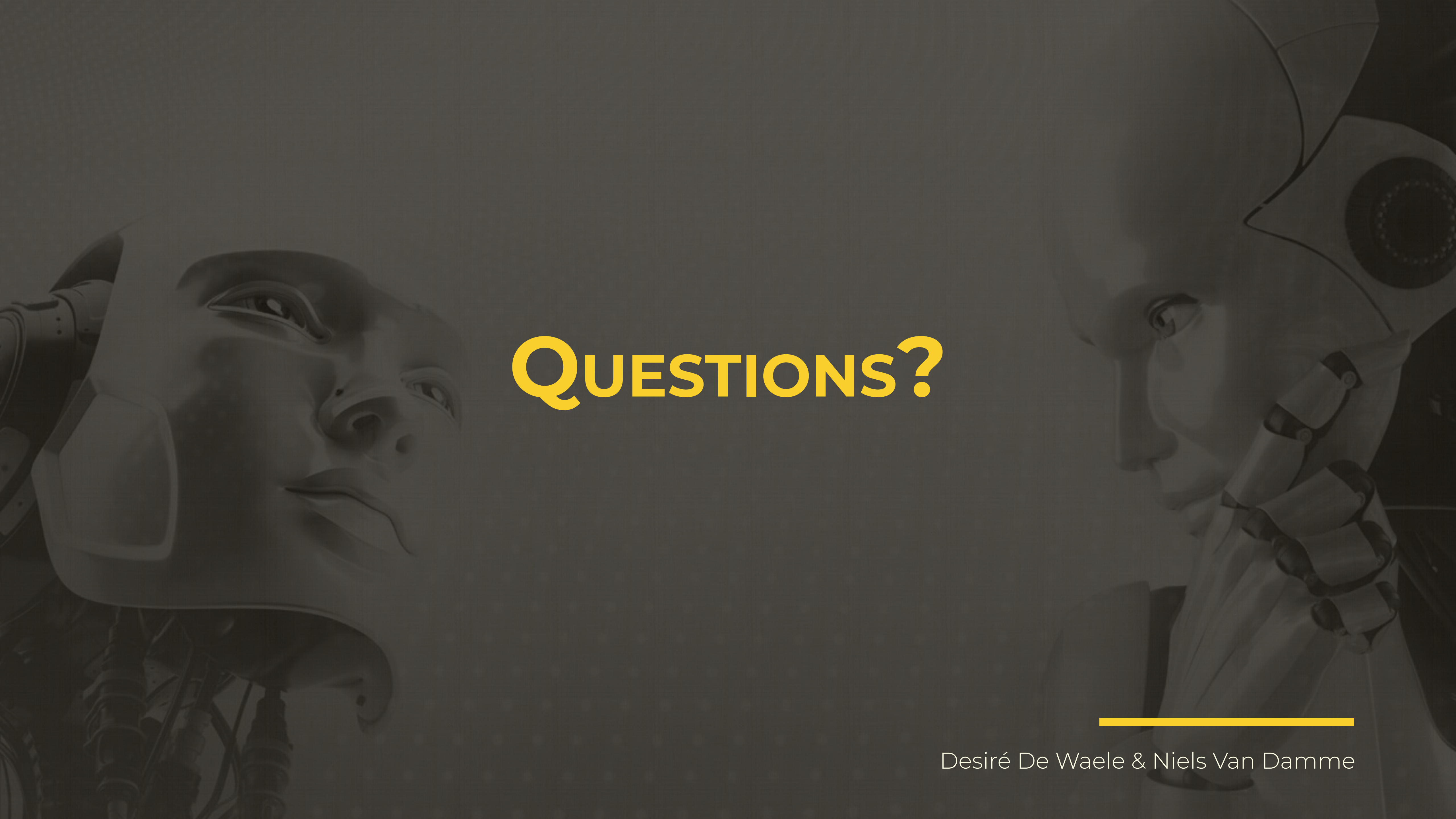
II. CURATE A CURRICULUM

Look for digital content that teaches required skills

III. PLAN A ROADMAP

With attention for potential pitfalls per step

Desiré De Waele & Niels Van Damme



Questions?

Desiré De Waele & Niels Van Damme

Partial Source

AI FOR EVERYONE

Course taught by AI’s leading man Andrew Ng, offered on Coursera.org

Deeplearning.ai

Google Brain Team

Desiré De Waele & Niels Van Damme

LET'S TALK

Reach out to us

MAIL

dewaele.desire@gmail.com
ndc.van.damme@gmail.com

LINKEDIN

Desiré De Waele
Niels Van Damme

WEBSITE

learnfromdata.ai/workshop

Parting words

Get on the AI hype train!

Desiré De Waele & Niels Van Damme