

## DIGITALIZATION, ARTIFICIAL INTELLIGENCE AND RELATED TECHNOLOGIES: DEFINITIONS

### Reference

Based on IETS TCP, Task XVIII,  
Subtask 1 final report:

*Digitalization, Artificial Intelligence and  
Related Technologies for Energy  
Efficiency and GHG Emissions Reduction  
in Industry, SubTask1: Needs and  
Interests Assessment*

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### Introduction

Harnessing and analyzing a wide variety of data from different sources through Process Digitalization Technologies will allow energy-intensive process sectors to, amongst other things, improve product quality, increase manufacturing throughput, grow insight into the root causes of manufacturing issues, reduce machine failure and downtime, and render supply chains more efficient.

Energy-intensive process industries - such as forestry, mining and smelting, oil and gas, energy production, chemical and fertilizers - increasingly have implemented sophisticated data

management systems to capture process data across the supply chain for logistical decisions, as well as at the process level for quality, control and automation purposes. This dataset has potential to be at the foundation of the opportunity to identify new strategies for achieving radical GHG emissions reduction – related to significantly increased efficiency and improved competitiveness. However, this landscape is complex, and it is unclear where to start and what areas to prioritize.

### Definitions

In a broad range of literature, digitalization, artificial intelligence (AI), and related technologies (Big Data, Data Analytics, Internet of Things (IoT), Automation, Control, etc.) are conceptual terms that are closely associated and often used interchangeably. Below the most common definitions of the terms in the field of digitalization are listed.

Big Data refers to data sets that are too large, complex or varied to be processed and managed by conventional methods and models. But when harnessed, it provides insight and potentially helps businesses to prepare for future trends and increased productivity.

An important question concerns the difference between regular Data Analysis and Big Data. Although the answer to this question should not be considered straightforward, the Figure shows several

characteristics that define Big Data. These characteristics can be referred to as the four V's, and in the area of digitalization, significantly increase the scope of information and knowledge that can be extracted from data.

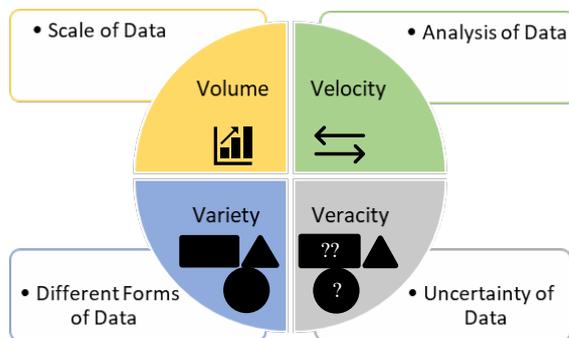


Figure: The four V's of Big Data

## Digitalization Lexicon

### Digitization

Automation of existing manual and paper-based processes, from an analog to a digital format.

### Digitalization

Process of employing digital technologies and information to optimize business operations, create new revenue and optimize costs.

### Process digitalization

Digitalizing processes means that some digital technologies are being used in processes and managing data digitally (digitized data and digitally native data), in order to convert processes (not simply digitization) into processes more efficient, more productive, more profitable and with greater customer satisfaction in their digital and physical experience with the company.

### Big Data

Data sets are becoming bigger and more complex than traditional data-processing application software is inadequate to deal with them. Big Data challenges include capturing data, data storage, data analysis, search, sharing, transfer, visualization, querying, updating, information privacy and data source.

### Artificial intelligence (AI)

Simulation of human intelligence processes by machines, especially computer systems.

### Data analytics

Process of examining data sets in order to draw conclusions about the information they contain, increasingly with the aid of specialized systems and software.

### Internet of Things (IoT)

The Internet of Things (IoT) is the network of physical devices, vehicles, home appliances, and other items embedded with electronics, software, sensors, actuators, and connectivity that enables these things to interconnect and exchange data.

### Industry 4.0

Industry 4.0, also known as the Fourth Industrial Revolution, integrates Internet of Things (IoT), data integration, cloud computing, and other technological advances into the heart of the production and manufacturing systems.

### Automation

Creation of technology and its application in order to control and monitor the production and delivery of various goods and services. It performs tasks that were previously performed by humans

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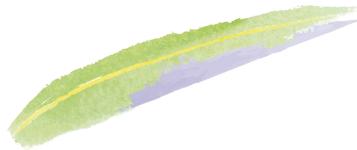
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## About the IETS TCP

The IEA TCP on Industrial Energy-Related Technologies and Systems (IETS), founded in 2005, is dealing with new industrial energy technologies and systems.

The mission of IETS is to foster international cooperation among OECD and non-OECD countries for accelerated research and technology development of industrial energy-related technologies and systems. In doing so, IETS seeks to enhance knowledge and facilitate deployment of cost-effective new industrial technologies and system layouts that enable increased productivity and better product quality while improving energy efficiency and sustainability.

Through its activities, IETS will increase awareness of technology and energy efficiency opportunities in industry, contribute to synergy between different systems and technologies, and enhance international cooperation related to sustainable development.

## Disclaimer

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