





Brazilian National Service for Industrial Training THE FUTURE OF WORKFORCE



## Future Skills Conference Brazil

### November 2019





Alan Turing "Computing

Machinery and Intelligence"

2016

Brazilian National Service for Industrial Training THE FUTURE OF WORKFORCE

1930

Luddites



## THE FUTURE OF WORK

Occupations are susceptible to automation

- 47% in the EUA1
- 57% in OCED<sub>2</sub>
- 69% in Índia<sub>2</sub>
- 77% in China<sub>2</sub>
- 54% in Brazil₃

Fonte: 1-Frey e Osborne (2013); 2-World Bank 3 – LAMFO/UNB



## **WORK IN 2065**



54 COUNTRIES GATHER

### 78% of global employment

MORE THAN HALF OF WORK ACTIVITIES CAN BE AUTOMATED WITH CURRENT TECHNOLOGY WITHIN THE NEXT DECADE.



• **50%** of jobs have automation potential

• 69% in the industry

Fonte: McKinsey



What does

### the FUTURE of WORK depend on?





### **VELOCITY**



### TECHNOLOGICAL DIFFUSION



## THE REALITY



#### Densidade de robôs no Brasil está muito abaixo da média global, de 74 deles a cada 10 mil trabalhadores







## THE REALITY









 PREMATURE DESINDUSTRIALIZATION IN EMERGING AND DEVELOPING COUNTRIES

NEW MODELS OF GROWTH AND TRAINING OF WORKERS

Fonte: World Bank







### What do we want from the future?

### **INFLUENCERS AND PROTAGONISTS**

or

### **RESPONSIVE REACTIVES?**







### **HOW WILL THIS TRANSITION OCCUR?**

# How will we balance today and tomorrow?









### HOW TO ANTICIPATE THE FUTURE OF SKILLS?

### SENAI's Foresight Model



### Industrial Labor Map



#### EMERGING TECHNOLOGIES (Market presence in diffusion process)

### TECHNOLOGICAL ROUTES (Premarket)

#### MEGATRENDS

FUTURISM (Speculation)

DISRUPTION

(Applied Innovation)



### SENAI's Foresight Model

BRICS FUTURE SKILLS

CONFERENCE







### Changes in the Labor Market and TVET





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### SENAI's Foresight Model



#### 4.0 Industry - Rate of Diffusion in the Brazilian Market

Specific Emerging Technologies	Rate of Technology Diffusion in the next 5 years	Rate of Technology Diffusion in the next 10 years
Digital automation with sensors for product identification and operating conditions	Up to 10% of the market	From 11 to 30% of the market
Digital automation without sensors	Up to 10% of the market	Up to 10% of the market
Collection, processing and analysis of large amounts of data (big data)	Up to 10% of the market	From 11 to 30% of the market
Incorporation of digital services in the products ("Internet of Things" or Product Service Systems)	From 11 to 30% of the market	From 31 to 50% of the market
Additive manufacturing, rapid prototyping (3D printing)	From 11 to 30% of the market	From 31 to 50% of the market
Augmented reality	Up to 10% of the market	From 11 to 30% of the market
Neural Networks	Up to 10% of the market	From 11 to 30% of the market
Collaborative robotics	It will not spread	Up to 10% of the market
Applied robotic vision	Up to 10% of the market	From 11 to 30% of the market

### **SENAI's Foresight Model**



## TECHNOLOGICAL DIFFUSION ESTIMATION IN THE METALMECHANIC BRAZILIAN SECTOR

TECHNOLOGIES	2020-2024	2025-2029	2030-2034	
VIRTUAL REALITY	10%	30%	30%	
INTEGRATED ERP / HIGH-END CAD / CAM	10%	10%	10%	
SOFTWARE CAE FOR PRODUCT DESIGN	10%	10%	10%	_
QUICK PROTOTYPE - LASER SINTERIZATION	10%	10%	10%	
3D	30%	50%	50%	-
				-

#### FUTURE PROFESSIONS 2020-2034 BRAZILIAN METALMECHANICAL SECTOR

NEW PROFESSIONALS	BRIEF DESCRIPTION OF THE PROFESSIONAL'S ACTIVITIES	MAIN KNOWLEDGE	PRINCIPAIS HABILIDADES
TOOL MACHINE PROGRAMMER	Will program and execute machining processes for various parts and mechanical drawings, as well as their interpretation.	Mechanical design, CAD and CAM, manufacturing process, technical English.	Deductive reasoning, fluency of ideas, multitasking, perception of problems, creativity.
DESIGNER OF PROJECTS AND PRODUCTS	Will plan and execute parts designs for machines, equipment and tools.	Mechanical design, CAD and CAM, manufacturing process, materials mechanics, drawing techniques, visual communication, technical English.	Deductive reasoning, fluency of ideas, multitasking, perception of problems, creativity.
SPECIALIST IN INFORMATION MANAGEMENT	Will analyze and manage large amounts of data as well as ensure the integrity and security of the data.	Applied computing science; Computers and Electronics.	Digital fluency; Innovat
ADMINISTRATOR OF CONNECTIVITY	Will ensure the speed and integrity of processing, as well as the stability and availability of the network for automated machine connectivity.	Applied computing science; Computers and Electronics; Types of networks; types of data transmission.	Digital fluency: Innova' +



THE FUTURE OF WORKFORCE

### SENAI's Foresight Model



#### **New Professionals**

Occupation	% of companies that will demand this professional in the next 5 years	% of companies that will demand this professional in the next 10 years	
IoT analysts and programmers	Up to 10% of the market	From 11 to 30% of the market	
data scientist	Up to 10% of the market	From 11 to 30% of the market	
Robotics specialists	Del 11 al 30% de las empresas	From 11 to 30% of the market	
Designer of robotic neural networks and artificial intelligence	Up to 10% of the market	Up to 10% of the market	
Information and Automation Technician	From 11 to 30% of the market	From 31 to 50% of the market	
CLP programmer	From 11 to 30% of the market	From 11 to 30% of the market	
Software engineers	Up to 10% of the market	From 31 to 50% of the market	
Big data specialist	Up to 10% of the market	From 11 to 30% of the market	
Video engineers	Up to 10% of the market	Up to 10% of the market	
Cybersecurity Engineers	Up to 10% of the market	From 11 to 30% of the market	





	Year	Sectors studied									Total by Sector		
(ds	2013	Automation an Mechatronic	nd Visual s Communicatio	Renewable n Energy	Machines Work Tools (Precision Mechanics)	Plastics Die	Machines Work Tools (welding)	Electronics	Automotive	Metallurgy			9
	2014	Food and Bevar	age Automobile Technology	Chemistry	Refrigeration and Air Conditioning	Machines Work Tools	ICT	Telecommunication	Manufacture of Clothes				8
odel (M	2015	Agroindustry	/ Biofuels	Energy	Mining – Metallic Minerals	Mining - non- metallic minerals	Chemistry	Graphic					7
eight Me	2016	Food and Bevar	age Leather and Sho Industries	Civil Construction - Buildings	Machines Work Tools	Safety at Work	IT - Software	IT - Hardware					7
Forse	2017	Automation	Automotive	Shipbuilding	Wood Products and Furniture	Oil and Gas	Plastic Die						6
SENAI	2018	Civil constructi	on Civil Construction - Infrastructure	Renewable Energy - Photovoltaic	Renewable Energy - Wind energy	Renewable Energy - Solar thermal energy	Graphic						6
	2019	Textile Metal Mechani Industry		c Industry 4.0	Telecommuni	ication Industry	Textile Industry (Peru)	Manufacture of Clothes (Peru)					6
	Total MSP 2013-2018						49						
outes	2015	Stickers	Compositions	Synthetic Polymers	Biomaterials	Active Packaging - Food	Green Plastics	Recycling	Painting	Internet of Things	Robotics	Integrated Systems	11
S al K	2016	Hot Forming	Stationary batteries	Textile Enzimes	Hybrid manufacturing	Lean Logistic	Steels or Alloys						6
iboio	2017	Ergonomy	Occupational hygiene	Longevity and productty	Prevention of incapacity	Economy for OHS	Psychosocial Factors						6
echn	2018	Life Style	TICs for Management of WS										2
											T Tetel /	otal TR 2015-2018	25
											i otal A	Amount of Studies	/4

Brazilian National Service for Industrial Training











TRAINING (new courses and curricula updates)

#### PROSPECTIVE STUDIES

UPDATE OF SKILLS

IMPACTS AT WORK

MONITOR TRENDS



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### **Industrial Labor Map**



Instrument for shortterm planning of SENAI course offerings, based on the behavior of the labor market.



Professional education offer planning



Assistance in decisions to open, expand or suspend courses



Definition of strategies to meet the demands of professional and technological education



### Industrial Labor Map 2019-2023



**BASIC SCENARIO** Less favorable to economic reforms 13.4 million employees until 2023 2 million / year **Training Demand 1.6 million / year** Demand for continuing education 450 thousand / year Demand for initial training

### **POTENTIAL SCENARIO**

More favorable to economic reforms

14.3 million

employees until 2023

2.3 million / year Training Demand

1.7 million / year

Demand for continuing training

#### 600 thousand / year

Demand for initial training

### Industrial Labor Map 2019-2023



### Occupations with the highest growth rate

Occupation	Туре	Accumulated growth rate up to 2023
Robotic Process Operators	Qualification	22,4%
Vehicle mechanics technicians	Technician	19,9%
Environmental and related engineers	Upper Level	19,4%
Engineering and technology researchers	Upper Level	17,9%
Planning, programming and logistics controls professionals	Technician	17,3%
Aircraft system and frame assemblers	Technician	15,5%

### Industrial Labor Map 2019-2023



### **Data Service**

#### Mapa do Trabalho Industrial - 2019 a 2023

	Cenário	Estado	Município	Macrossetor	Divisão CNAE - Descrição
Filtros	🕘 Cenário Base	(Tudo) 🔹	(Tudo) 🔹	(Tudo)	(Tudo)
	<ul> <li>Cenário Potencial</li> </ul>				

#### Média anual da demanda por formação em ocupações industriais entre 2019 e 2023





## **A NEW ROLE**



TVET

is key to the dissemination of knowledge and new technologies 4.0 to companies, workers and young people







### **BRICS Center for the TVET**

Share foresight studies methodology and labor market findings

Share of data base on
BRICS countries

Develop a common strategy for BRICS countries on future





## • **THANK YOU!!!**

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