

“Tech and forestry: the Uruguayan way”

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November 2022

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**FERRANDO
& ASOCIADOS**







Santiago Ferrando: Agronomy – Forestry Engineer.



Mg Statistics and Data Science.



Montes del Plata

2005 - 2018



2017



2019



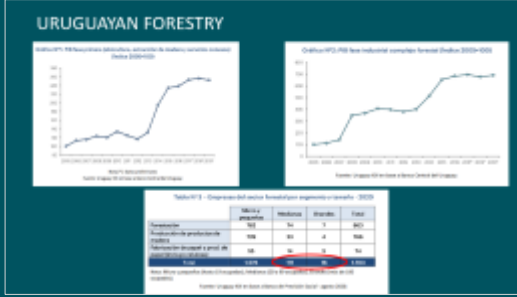
WE ARE



“ A bridge between Tech & People with a forestry focus”.

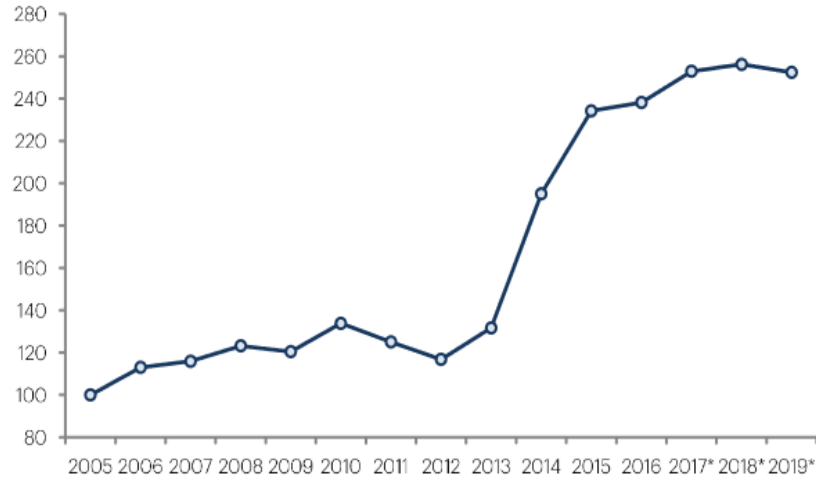
Find the best
solution to complex
problems

From the nursery to the industry, we are motivated to find the best solution to the problems that the different actors in the forest chain need to solve, regardless of the type and size of the problem to be solved.



URUGUAYAN FORESTRY

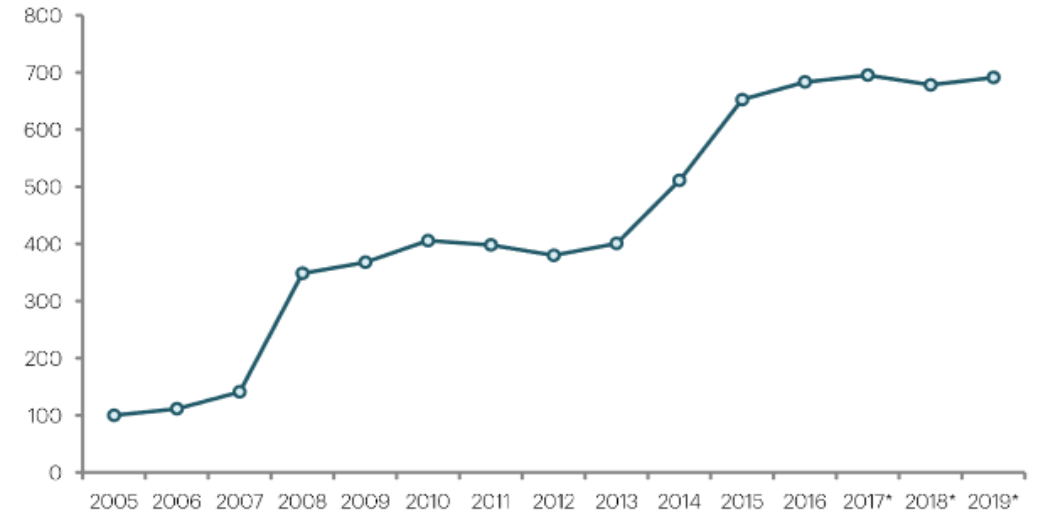
Gráfico N°1: PIB fase primera (silvicultura, extracción de madera y servicios conexos)
(Índice 2005=100)



Nota (*): Datos preliminares

Fuente: Uruguay XXI en base a Banco Central del Uruguay.

Gráfico N°2: PIB fase industrial complejo forestal (Índice 2005=100)



Fuente: Uruguay XXI en base a Banco Central del Uruguay.

Tabla N°3 – Empresas del sector forestal por segmento y tamaño - 2020

	Micro y pequeñas	Medianas	Grandes	Total
Forestación	782	74	7	863
Producción de productos de madera	739	23	4	766
Fabricación de papel y prod. de papel (incluye celulosa)	55	14	5	74
Total	1.576	111	16	1.703

Nota: Micro y pequeñas (hasta 19 ocupados); Medianas (20 a 99 ocupados); Grandes (más de 100 ocupados).







Fuente: Uruguay XXI en base a Banco de Previsión Social - agosto 2020.





SMART FORESTRY: SILVICULTURE UAV

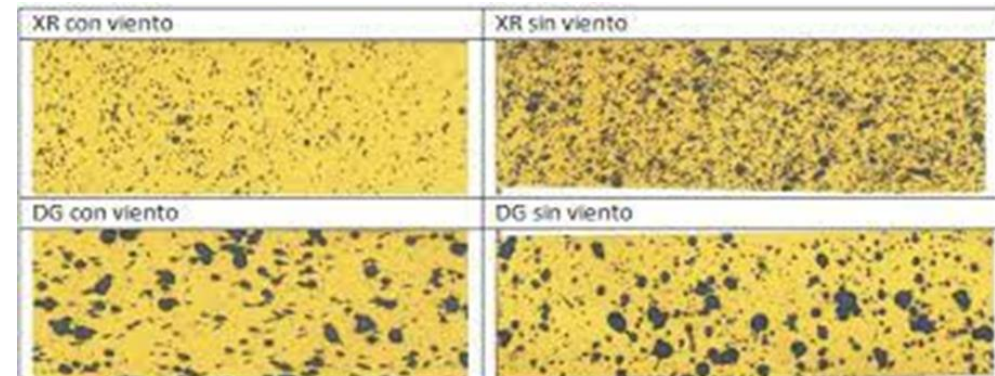
- Started in 2020.
- No drones operating in Uy Forestry.
- Exceptional to UAV tech

Uy operations experience: >10.000 ha	Líquids	
	•Herbicidas	
	•Fungicidas	
	•Insecticidas	
	Sólids	
	•Ant Control	
	•Seedling	



Liquids

- Herbicides
- Fungicides
- Insecticide



Sólids

- Ant Control
- Seedling



Uy operations
experience:
>10.000 ha

SILVICULTURE UAV

- **Spraying**: drop dimensions, drops/cm², wind speed & direction, optimal height, coverage, type of nozzles & work pressure, dosage and speed of work. Chemicals and mixing.
- **Spreading**: dosage, width, height, calibration.





Training

SILVICULTURE UAV



“COMBIDRON”

Equipment for Drone logistic.





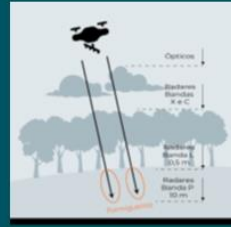
win10.io



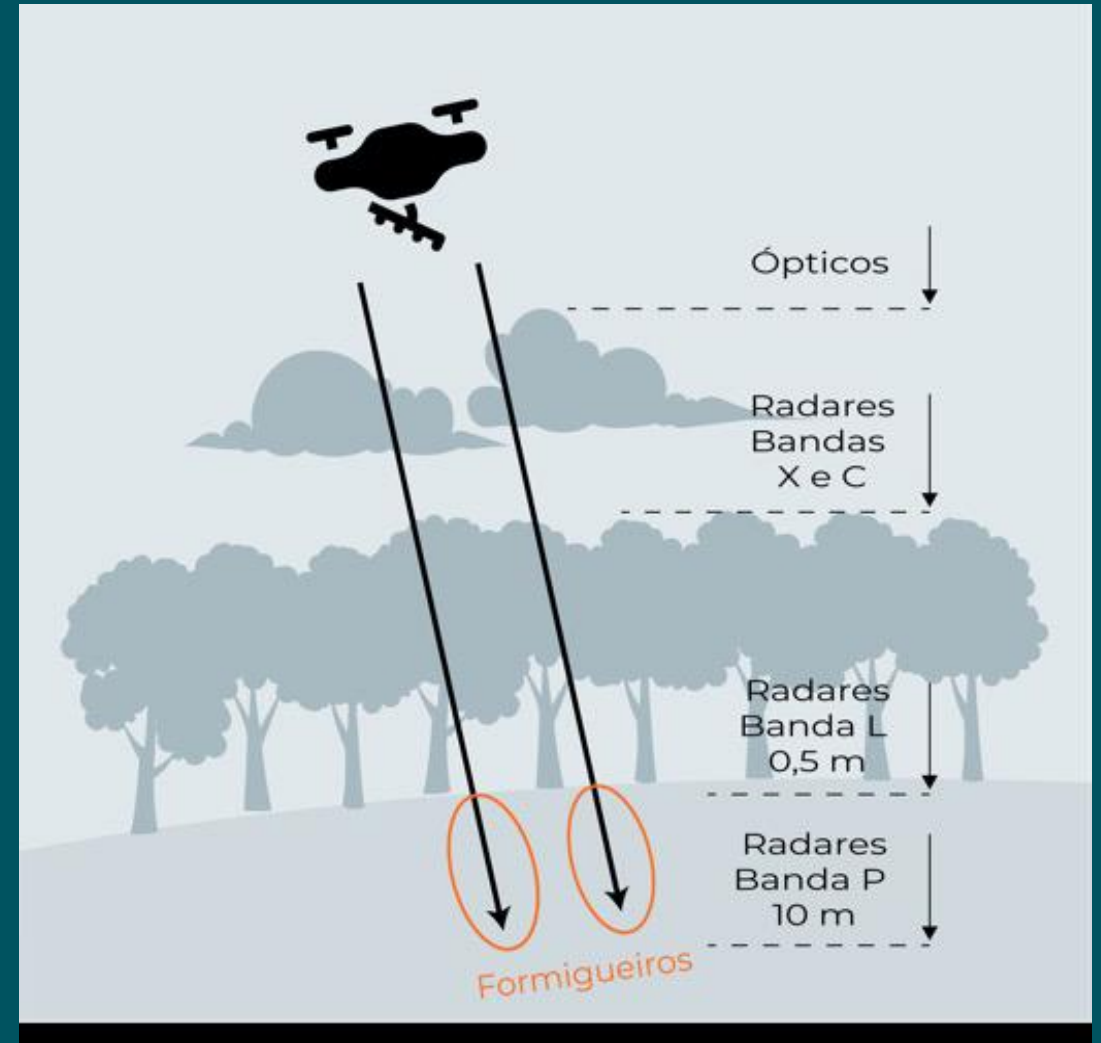
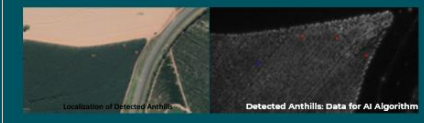
LiDAR: M300 with L1

- Determination of dasometric variables in stands of *Eucalyptus dunnii*
- Measure variables: height, basal area and diameter of trees and crowns.
- Relate quality of the site with survival.
- Validate tech for young Euca (<1 year):
 - reduce costs?
 - improve data quality?
 - reduce time?
 - improve accuracy?

Drone SAR



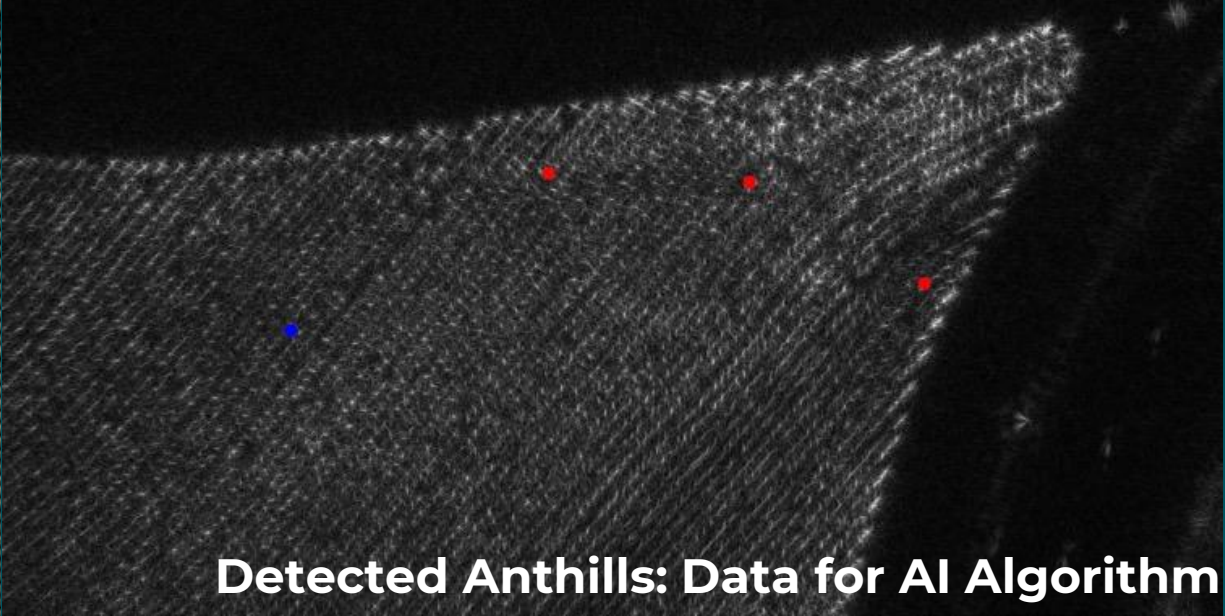
Drone SAR



Drone SAR



Localization of Detected Anthills



Detected Anthills: Data for AI Algorithm

Tools to scale forest remote sensing – complementing forest inventory

Forest Monitoring
EN
Santiago Ihlenfeld
FMA - Manager

<
2021/03/21
2021/04/02
2021/04/14
2021/04/27
2021/05/10
2021/06/04
2021/06/17
2021/06/22
2021/06/29
2021/07/02
2021/07/12
>

<

ANOMALIES

VISUAL

ARVI
0.22
u = 0.22 (28%)
-0.22(0%) - 0.33(0%)

GCI
2.93
u = 2.93 (24%)
1.19(0%) - 3.71(0%)

NDVI
0.71
u = 0.71 (32%)
0.27(0%) - 0.78(1%)

SAVI
0.33
u = 0.33 (32%)
0.00(0%) - 0.72(1%)

SIPI
0.83
u = 0.83 (46%)
0.60(0%) - 1.41(0%)

SR
6.10
u = 6.10 (26%)
1.73(0%) - 8.01(0%)

TVI

VIZ

COMPARE

>



Area : 2389.00 Ha
Demo AOI [go to](#)

Area of Field19 : 106 Ha



Histogram Data



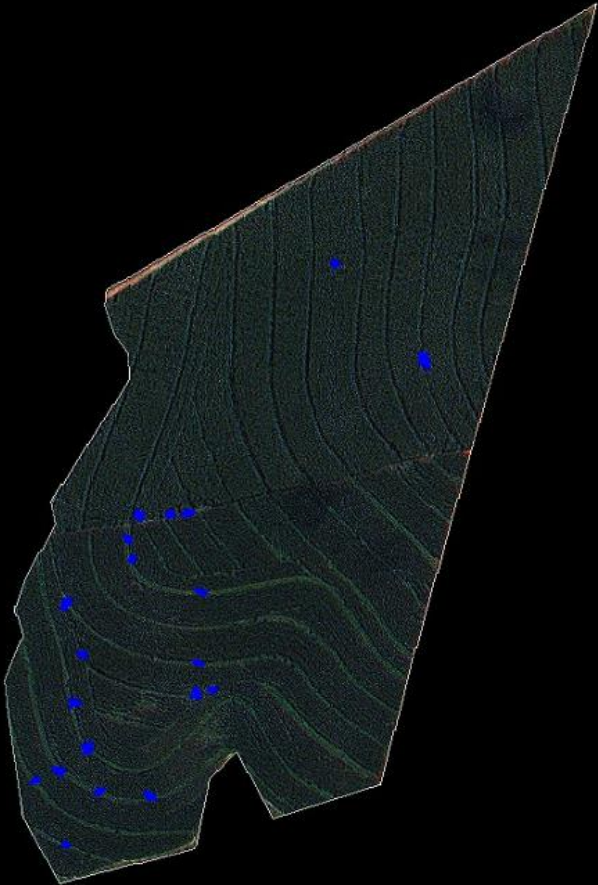
Bucket Name	% Of Cover	Cover in Ha
Class1	0	0.00
Class2	0	0.00
Class3	16	16.96
Class4	82	86.92

Weather Data

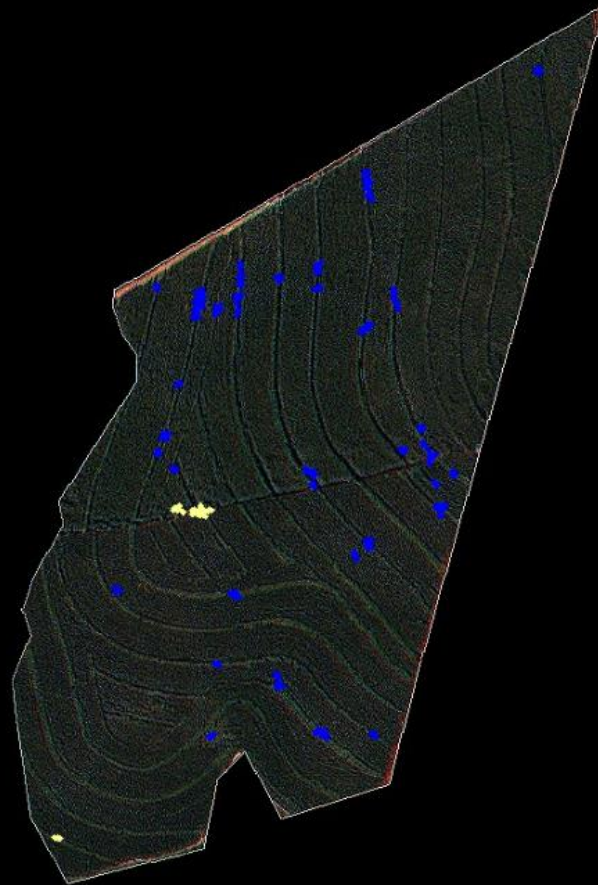
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-
0

Tools to scale forest remote sensing – complementing forest inventory

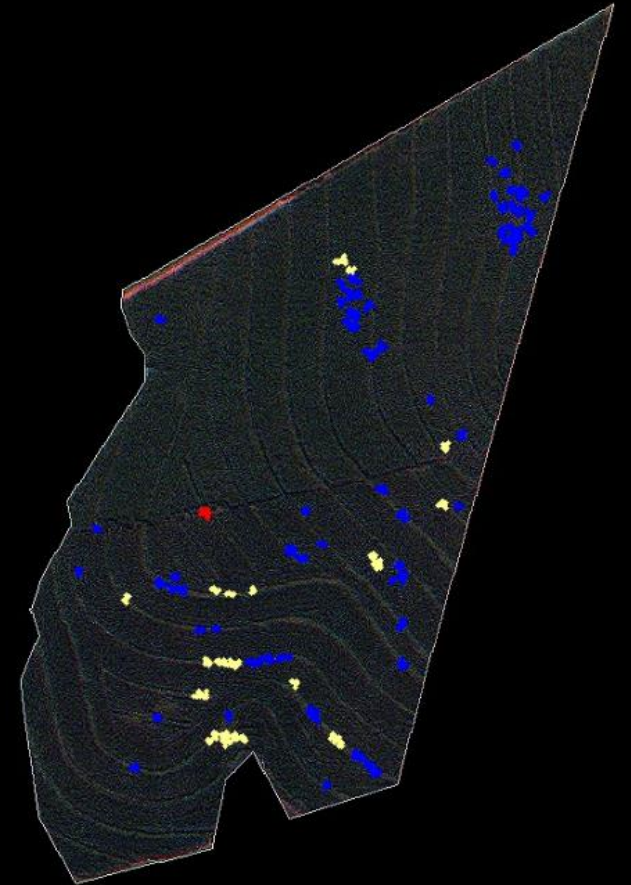
2021/03/21 - ANOMALIES



2021/04/02 - ANOMALIES



2021/04/14 - ANOMALIES



Tools to scale forest remote sensing – complementing forest inventory

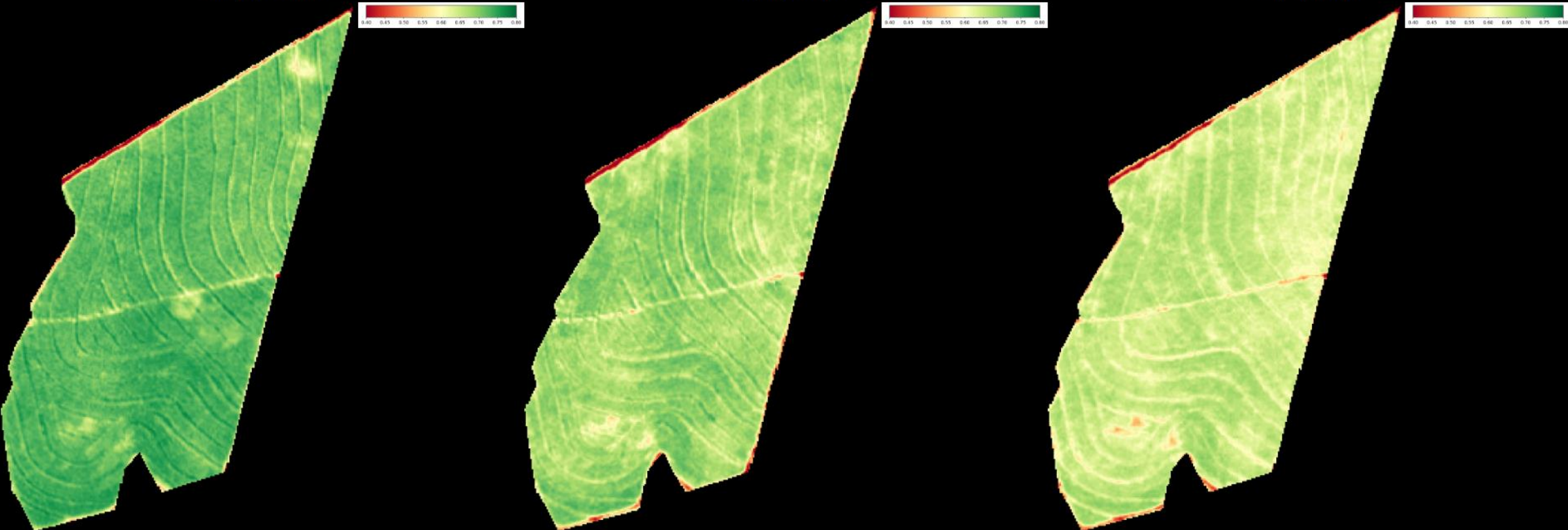
2021/03/21 - NDVI



2021/04/02 - NDVI



2021/04/14 - NDVI



Logging

- Machine learning: Clustering.
- Micro planning.



p25

Dashboard > Nombre del campo > p25

Eliminar Re-Optimizar



DISTANCIA MAXIMA TOTAL		DISTANCIA MEDIA TOTAL		
1407.67		341.12		
DISTANCIA MINIMA TOTAL		MADERA EXTRAIDA		
8.33		48506.15		
Bloque Id	Distancia Media	Distancia Maxima	Distancia Minima	Desvio Estandar
17708_84	319.55	1129.07	17.06	218.51
17708_88	353.64	1407.67	52.51	271.52
17708_86	400.34	897.29	14.48	206.23
17708_85	272.90	518.46	60.36	113.42
17708_92	429.37	1263.21	76.95	214.03
17708_87	288.45	1098.50	8.33	220.10
17708_93	599.36	924.96	431.55	112.21
17708_79	259.60	818.79	30.52	125.43
17708_80	187.24	374.74		

Activar Windows
Ve a Configuración para activar Windows.



AI: irrigation



AI: weed control



Colocación del módulo dentro de la cabina de la máquina de riego

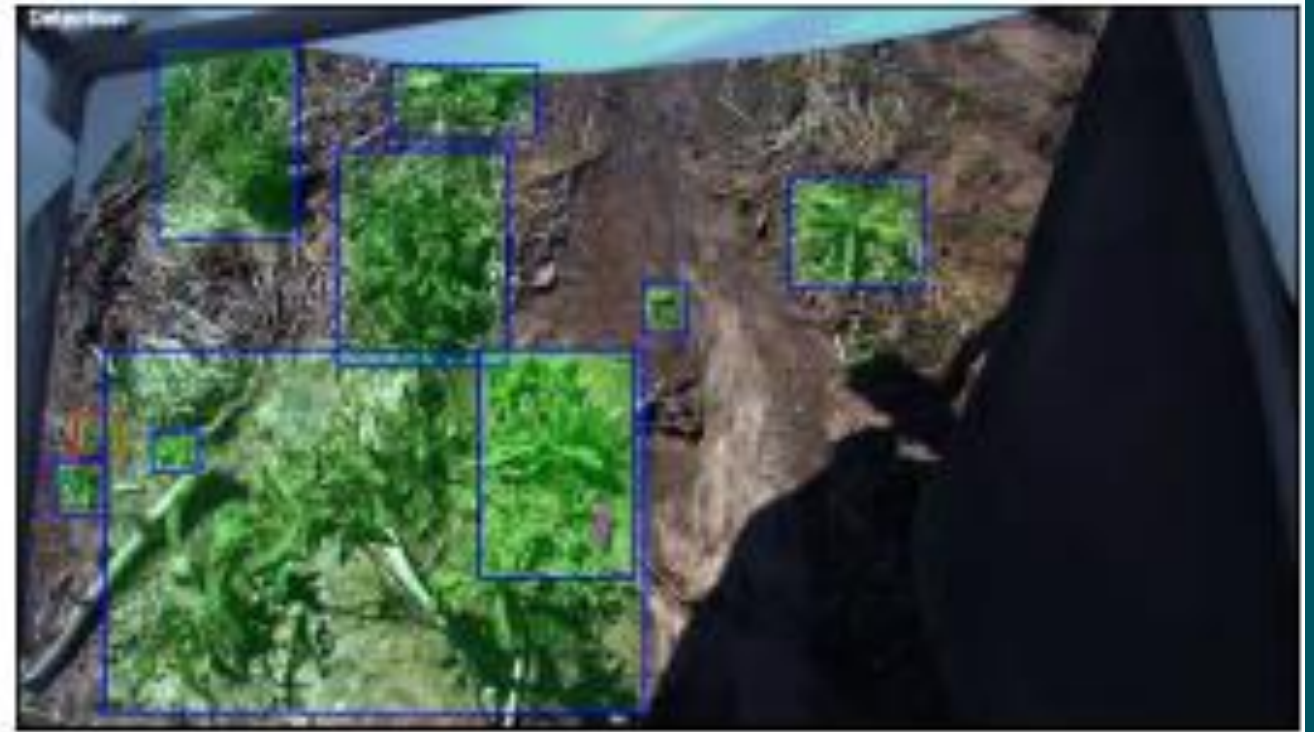
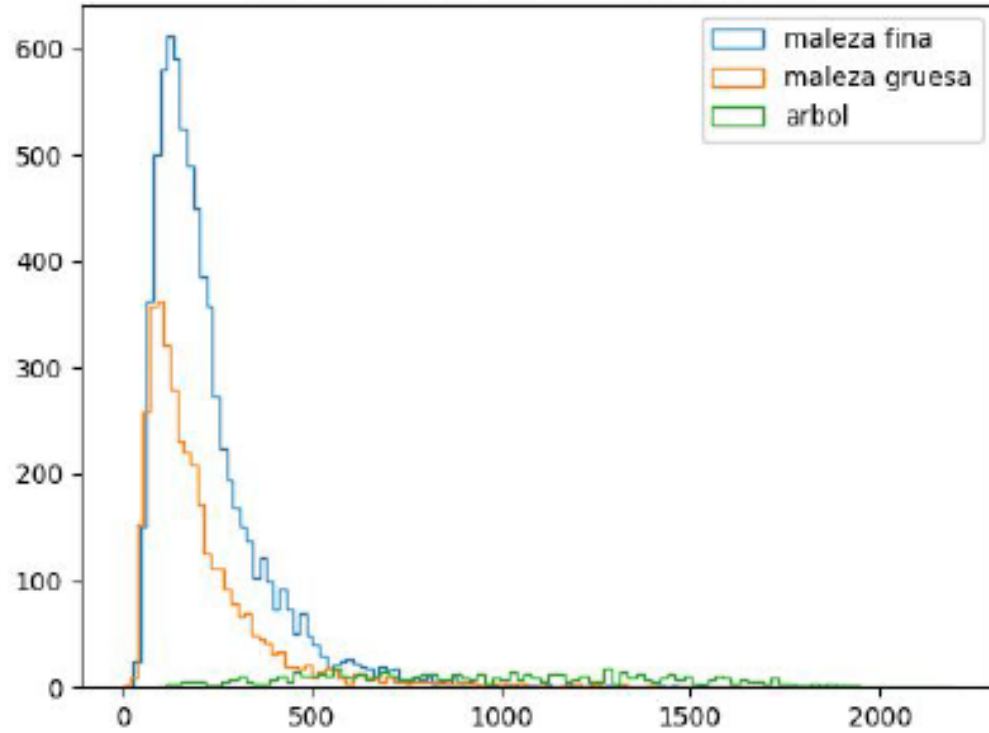


Módulo de procesamiento: placa y pantalla

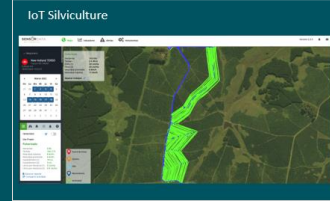
AI: weed control



Histograma: Distribución por tamaño



IoT Silviculture



- Easy use.
- Low cost
- Data
 - Monitoring
 - Dosage control
 - Operational control
- Information to Data

IoT Silviculture

← Maquinaria



New Holland TD95D

Tractor 69 / MGAP

Eufores S.A

18/03/2022 13:52:37

« Marzo 2022 »

Do	Lu	Ma	Mi	Ju	Vi	Sa
27	28	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	1	2
3	4	5	6	7	8	9



18/03/2022



Uso Propio

Pulverizado

Hectareas	0,56
Tiempo	14m 17s
Velocidad máxima	8 Km/h
Velocidad promedio	6 Km/h
Caudalímetro (1)	19 Lts
Caudalímetro (2)	3 Lts
Litros por hectarea (1)	0 Lts/Ha
Litros por hectarea (2)	4.9 Lts/Ha

Generar reporte

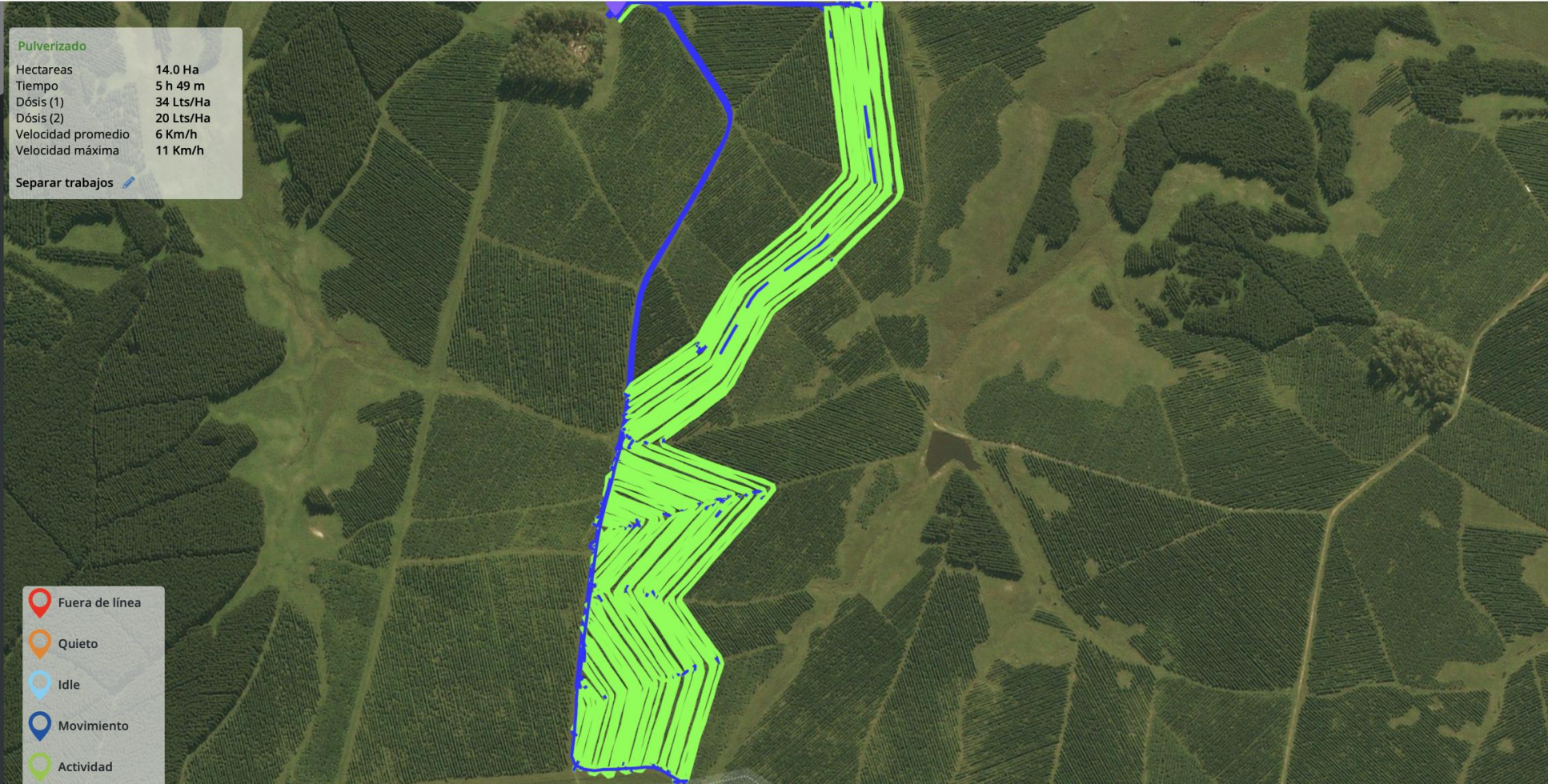
Compartir actividad

Pulverizado

Hectareas	14.0 Ha
Tiempo	5 h 49 m
Dosis (1)	34 Lts/Ha
Dosis (2)	20 Lts/Ha
Velocidad promedio	6 Km/h
Velocidad máxima	11 Km/h

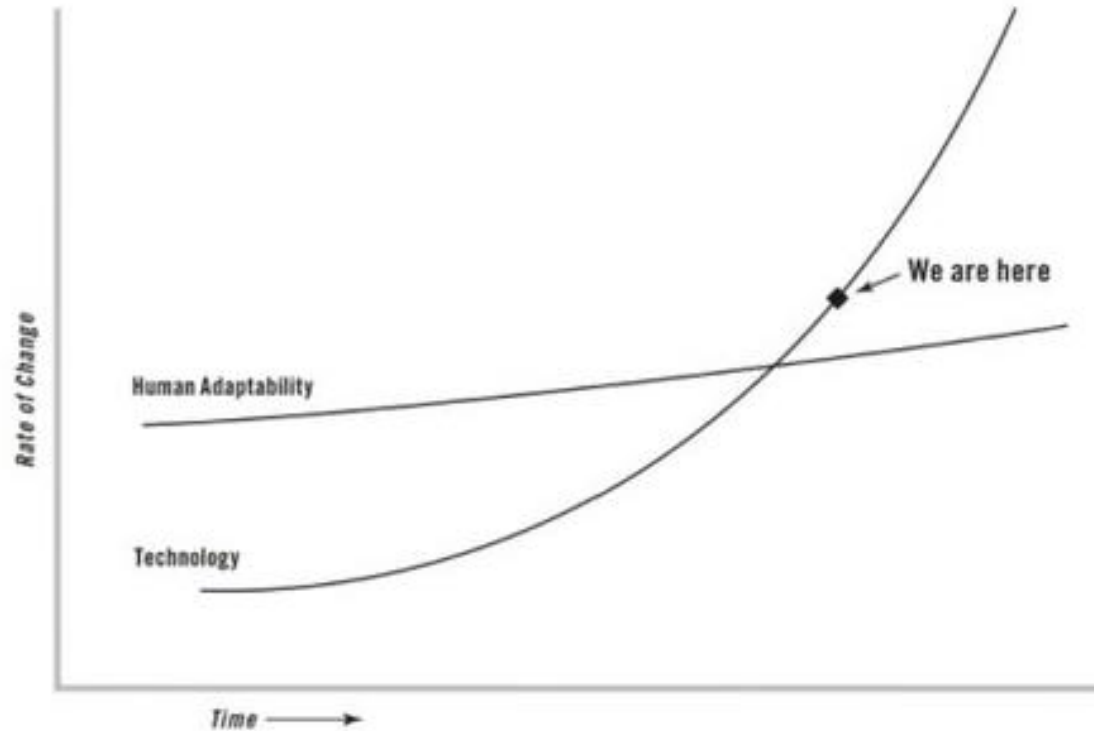
Separar trabajos

- Fuera de línea
- Quieto
- Idle
- Movimiento
- Actividad





Challenges



Today, humanity takes an average of 7-10 years to adapt to the scientific and technological changes that make the world a different and more advanced place.

The rate of technological change has accelerated so rapidly that it has increased in speed above the average rate at which most people can absorb these changes.

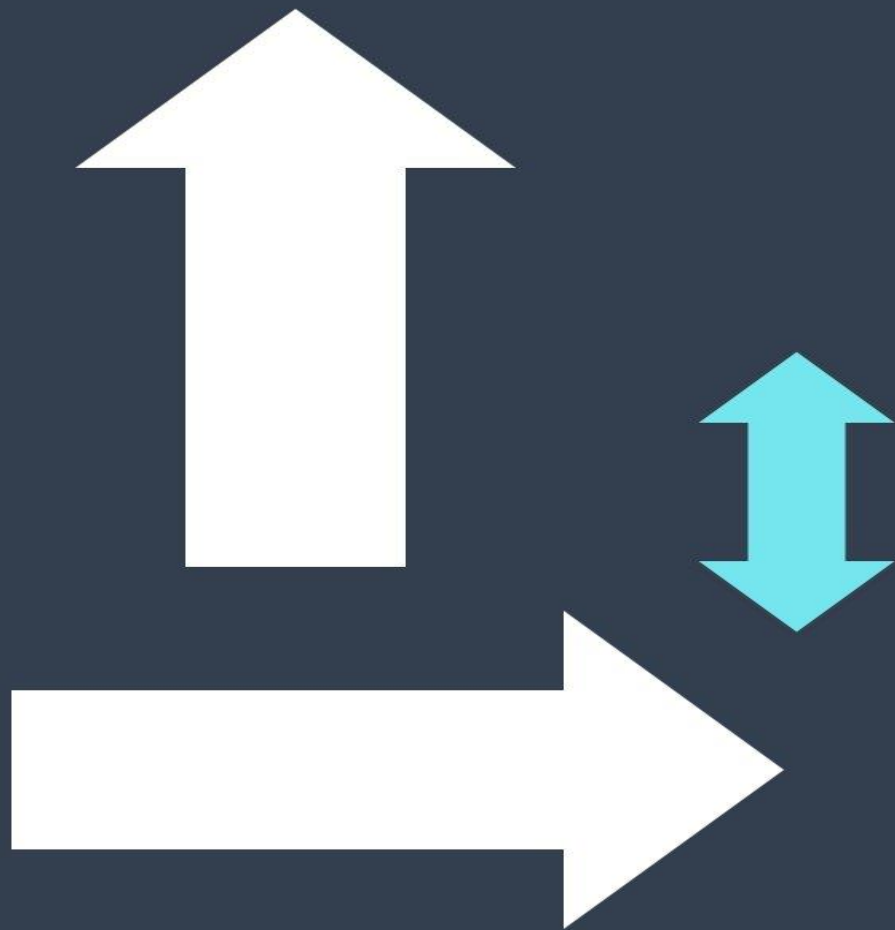
Fuente. Friedman, T. L. (2016) 'Thank you for being late: An optimist's guide to thriving in the age of accelerations', Penguin Group, London, p. 32.

Challenges



By Manuela Battagli

Challenges



TECNOLOGÍAS FÍSICAS

Internet, Big Data, Inteligencia Artificial/Machine Learning, Nano Tecnología, IoT, Robótica y automatización...

BRECHA CRECIENTE

TECNOLOGÍAS SOCIALES

Administración Públicas, Gobiernos, Educación, Cultura, Instituciones, Leyes...

By Manuela Battaglini

Thanks

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