



# Ergonomía y las TICs

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Msc. Ingeniería Biomédica

Especialista en Ergonomía

Odontólogo - Diseñador industrial

Auditor Interno en seguridad industrial y salud ocupacional.



La tecnología rediseña  
nuestra manera de vivir

La ergonomía y las tics



# 1. Contenido

Las TICs: generalidades

Los dispositivos móviles

Los entornos virtuales e inmersivos

La ergonomía Y



Avance tecnológico sin precedentes

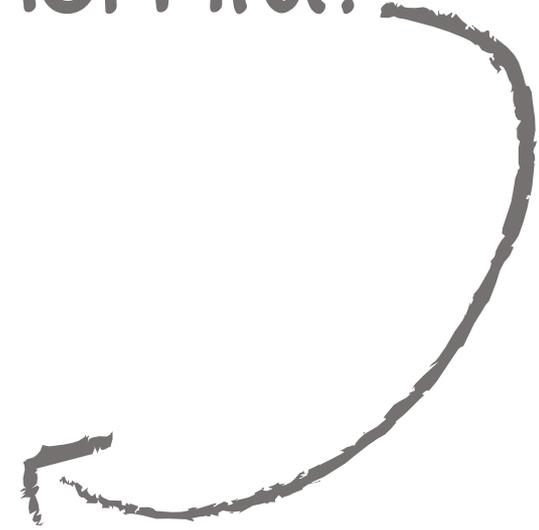
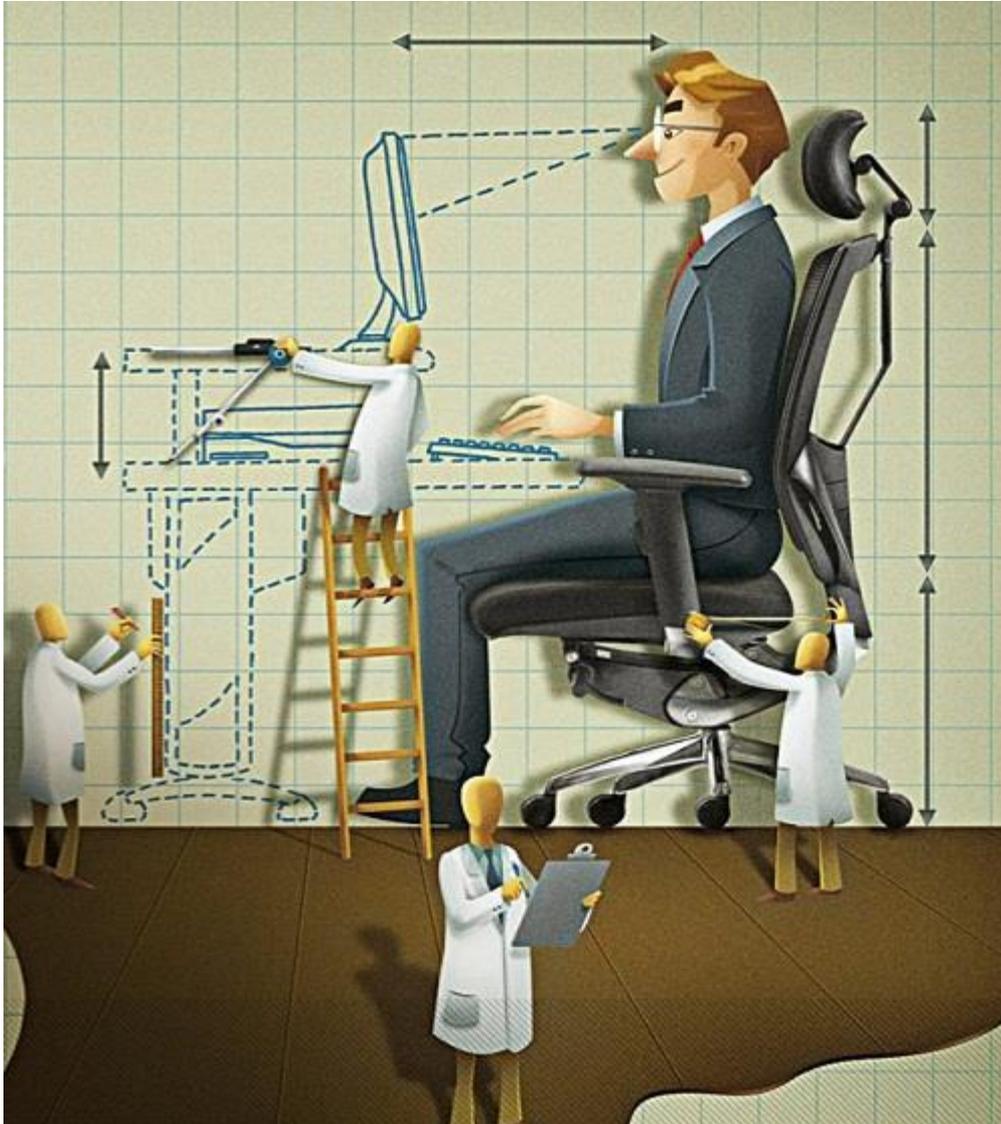
Revolución TIC



TIC: Tecnología de la Información y la Comunicación.



# ¿Y en ergonomía?



Competencia  
Digital ?



Renovación

Conocimiento

Moda

Miedo

Competencias

Valores

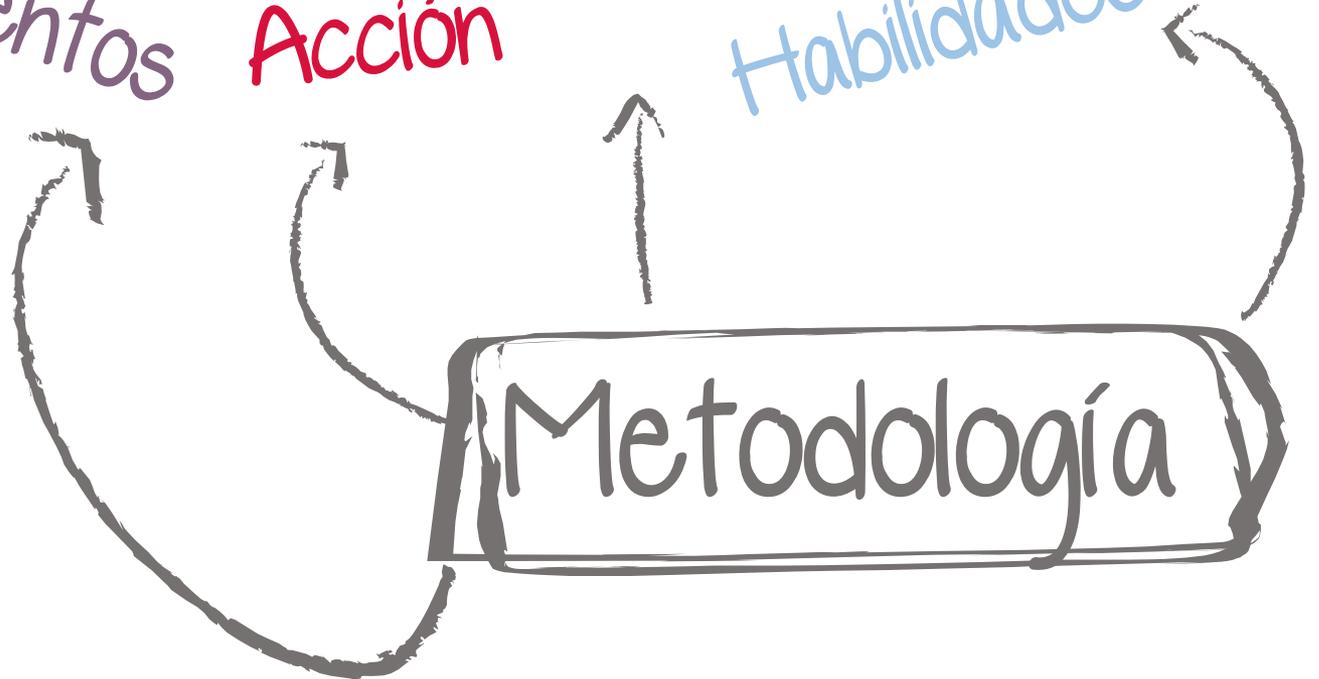
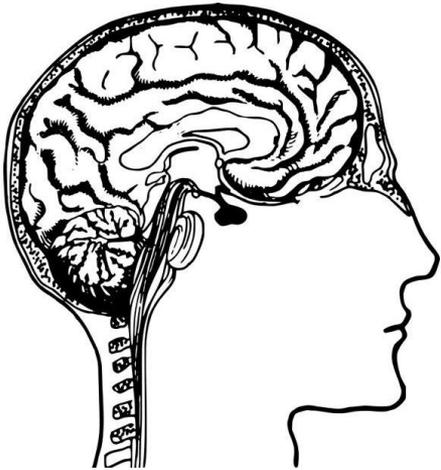
Actitud

Problema

Requerimientos

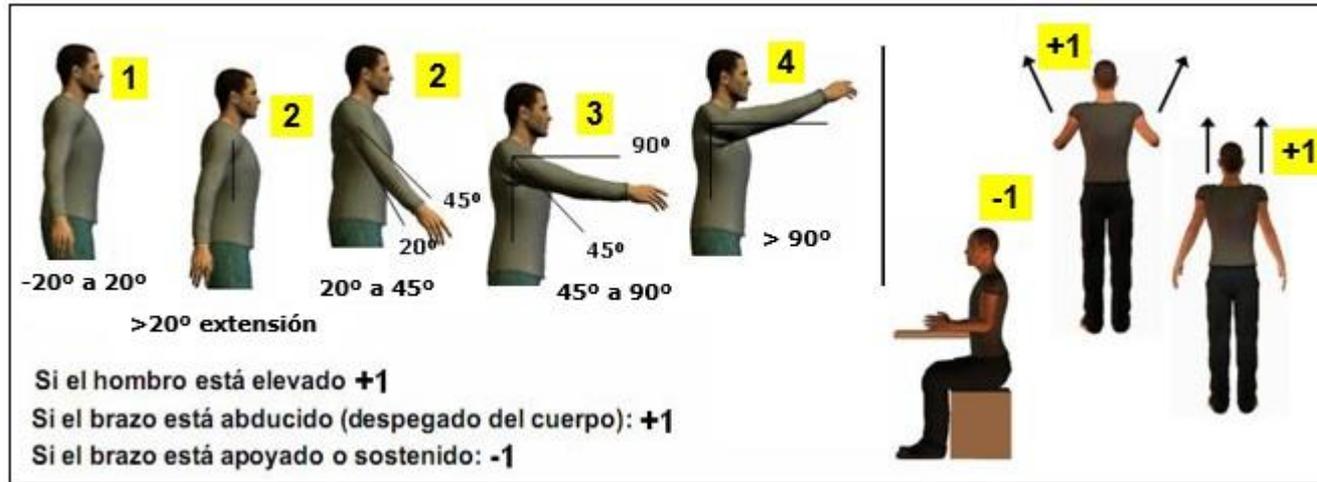
Acción

Habilidades



Metodología

# Metodologías



Sensibilidad?

Especificidad?

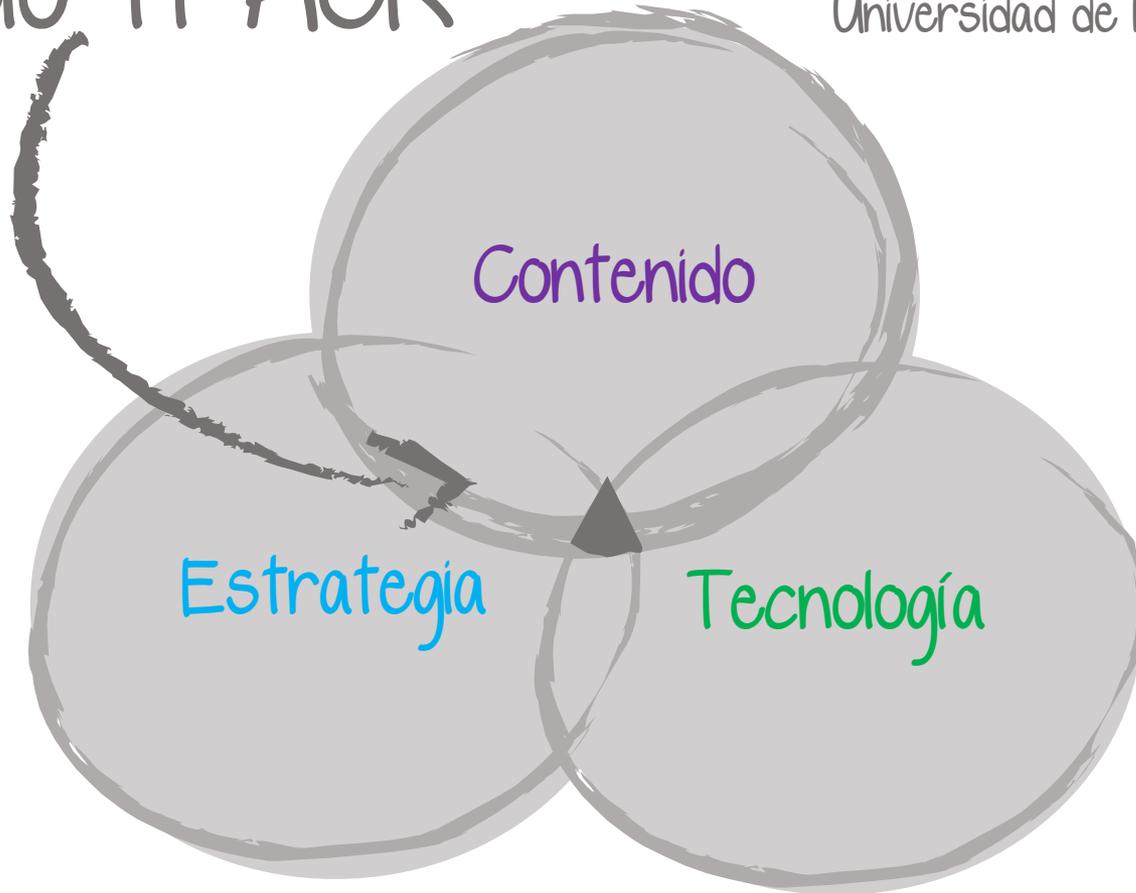
Subjetividad?

Competencia  
Digital ?

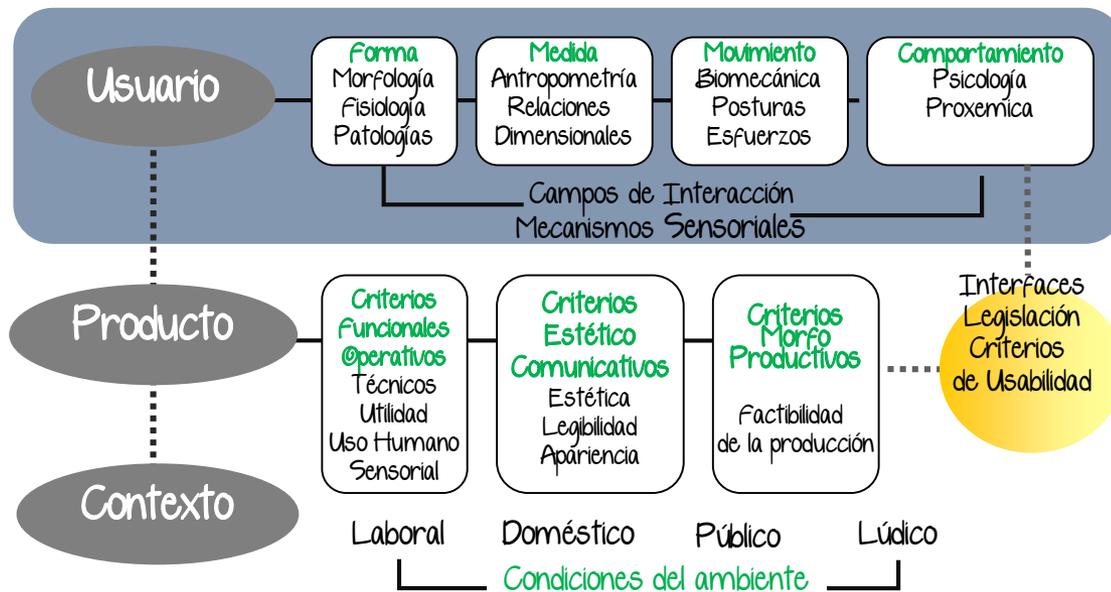


# Modelo TPACK

Koehler & Mishra  
Universidad de Michigan



# Concepción Metodológica



FUENTE: Notas Mg Luz Mercedes Sáenz

Las TIC



# Ideas prácticas



Decida la metodología, diseñe la secuencia y estructura las actividades

Selecciona las herramientas TIC y los recursos más adecuados.

Desarrolla tu competencia digital.

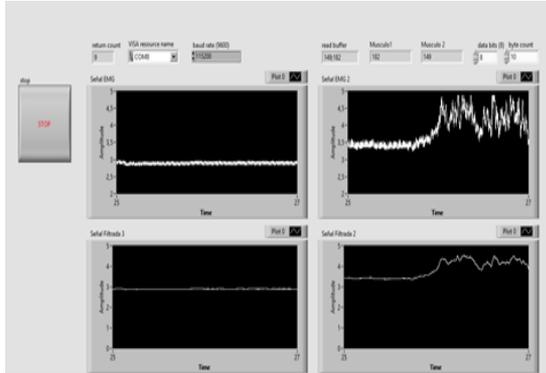
# Las TIC



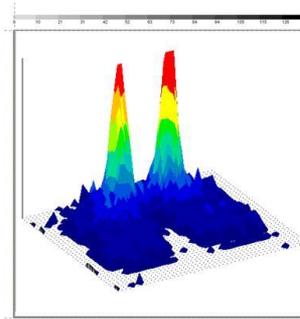
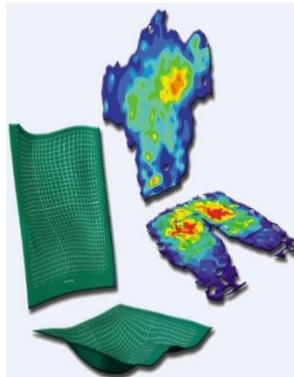
Dispositivos  
móviles



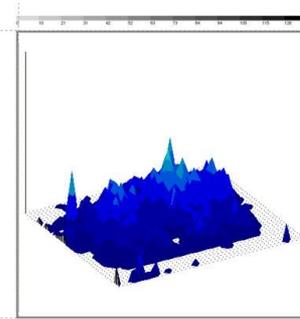
# Las TIC



Equipos biomédicos



SUJETO 36. SILLA TRADICIONAL



SUJETO 36. SILLA MERCURIO





# Aplicación del Instrumento de Branson para evaluación Postural

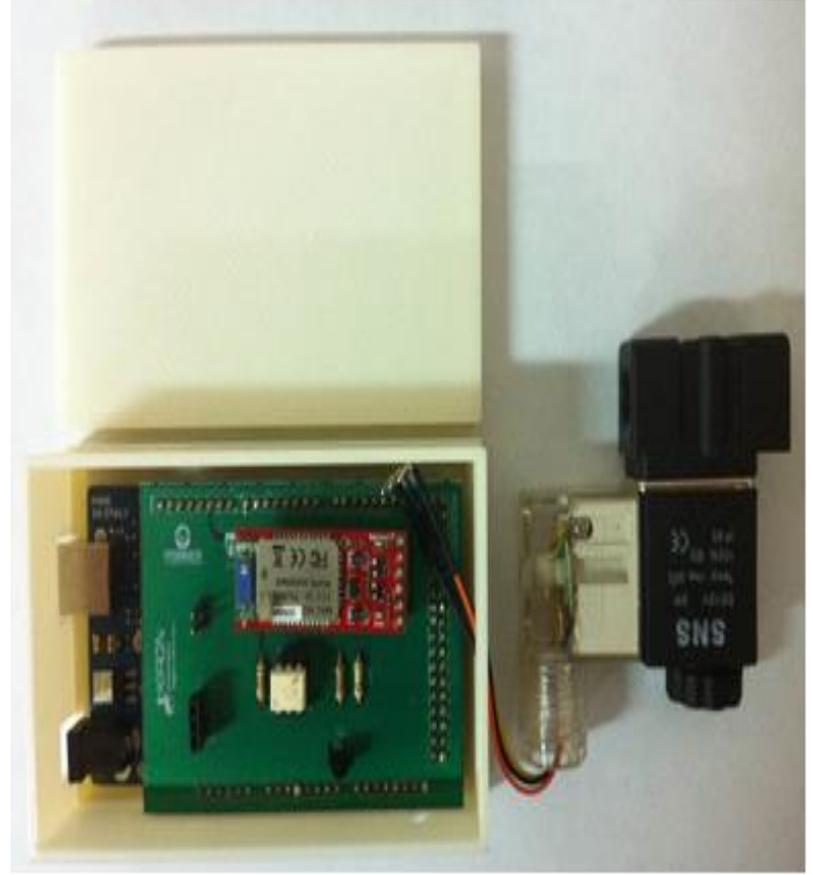


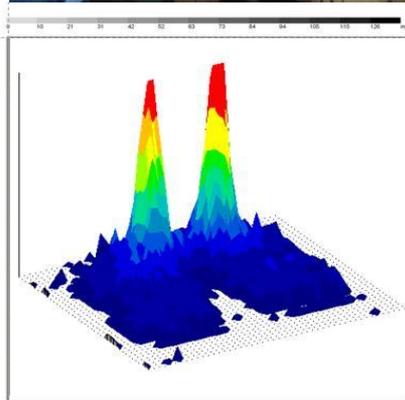
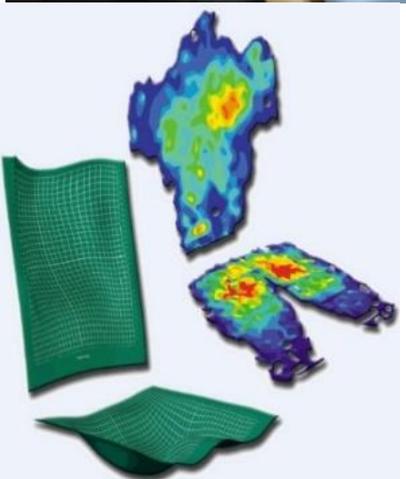
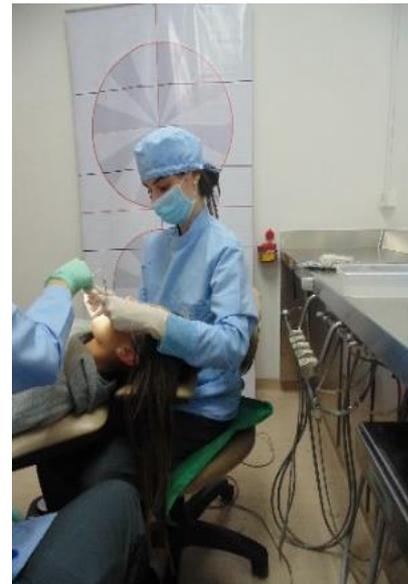
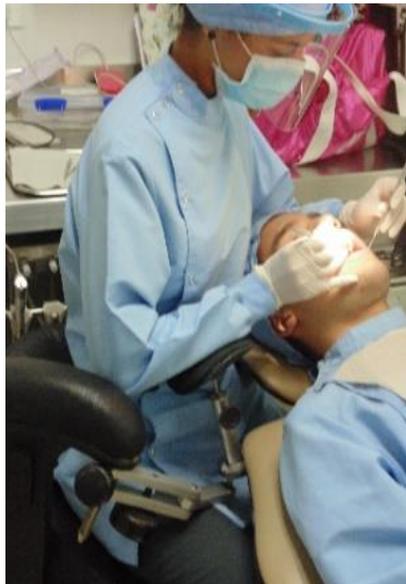
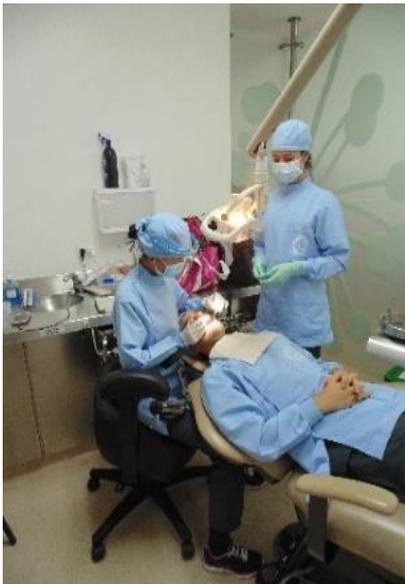




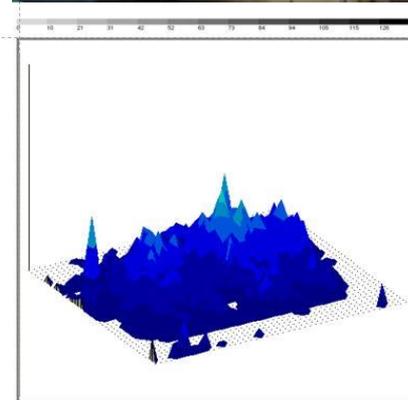




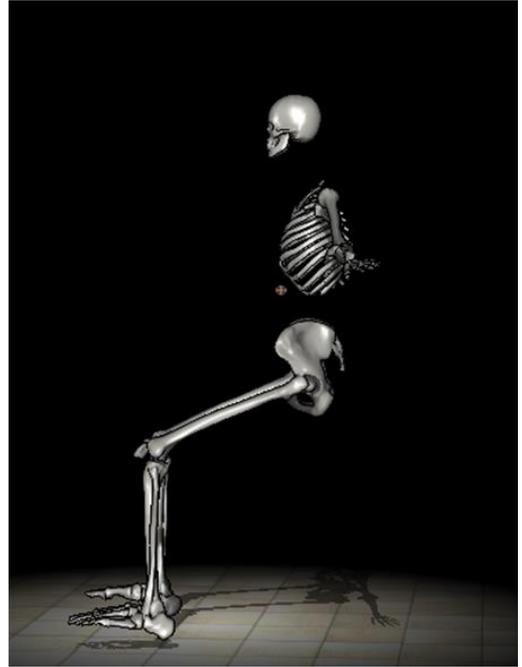
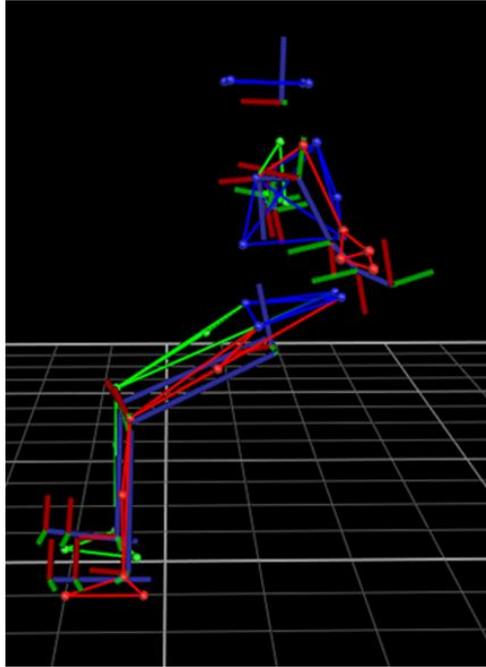


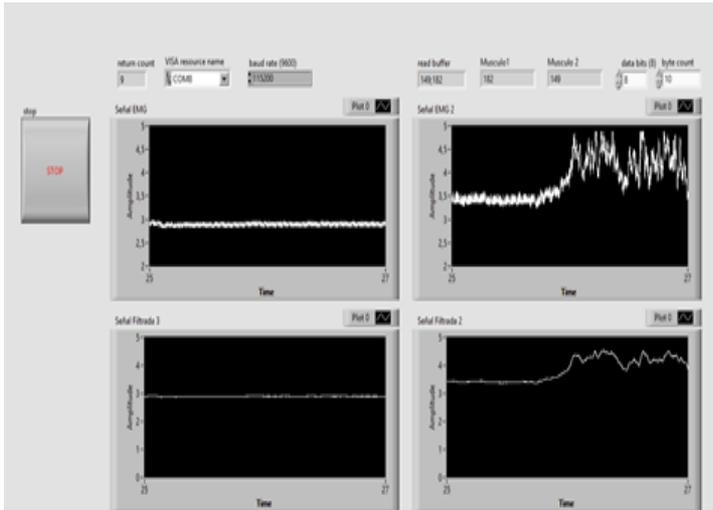
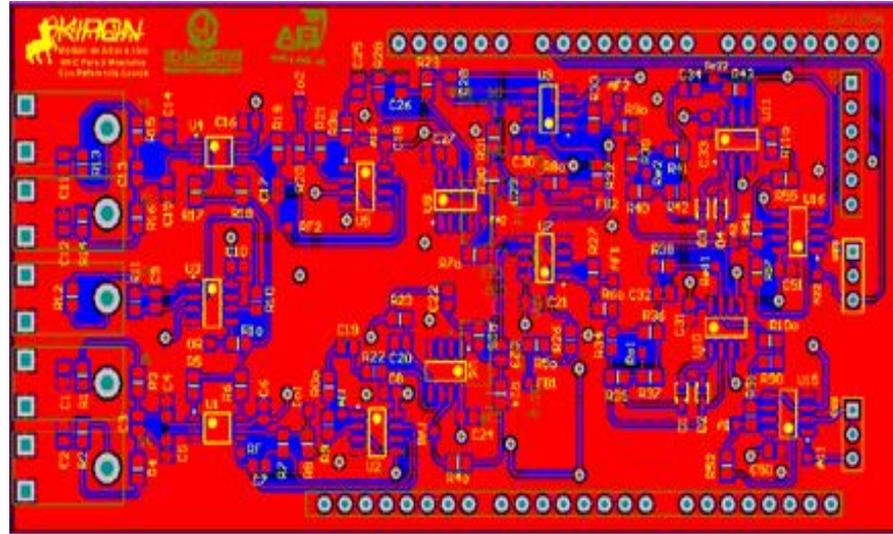
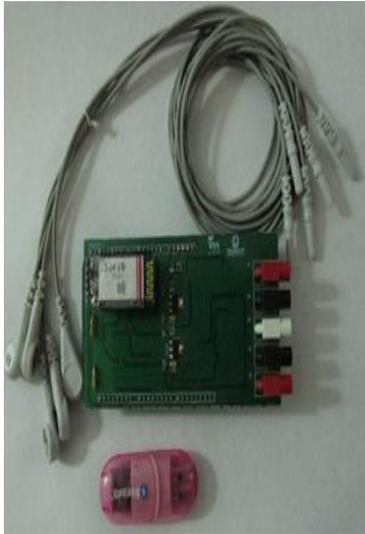


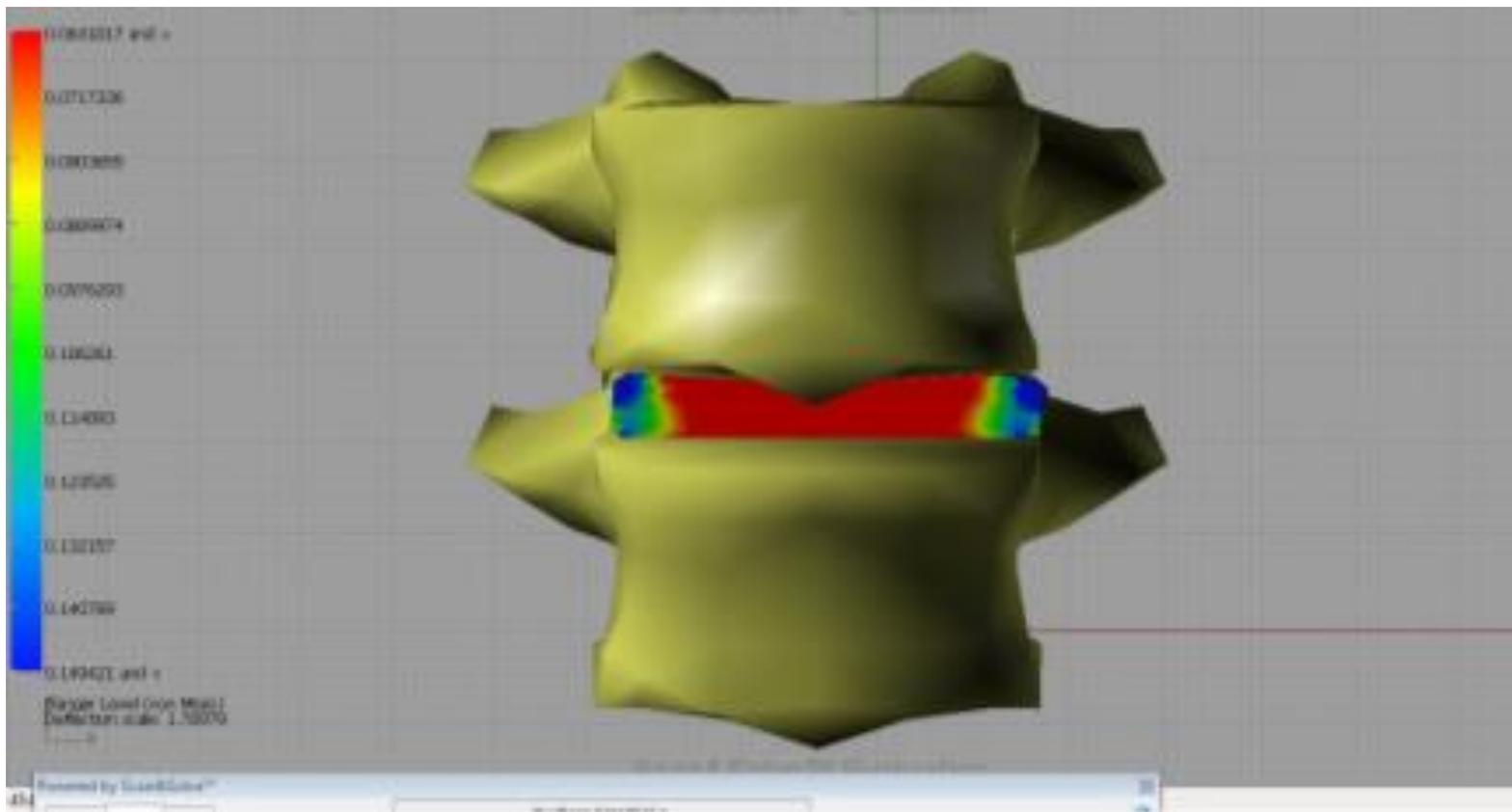
SUJETO 36. SILLA TRADICIONAL



SUJETO 36. SILLA MERCURIO







# Las TIC

## Dispositivos vestibles



# Las TIC



Entornos  
virtuales 3D

Manufacturing Operations in Virtual Environments (MOVE)

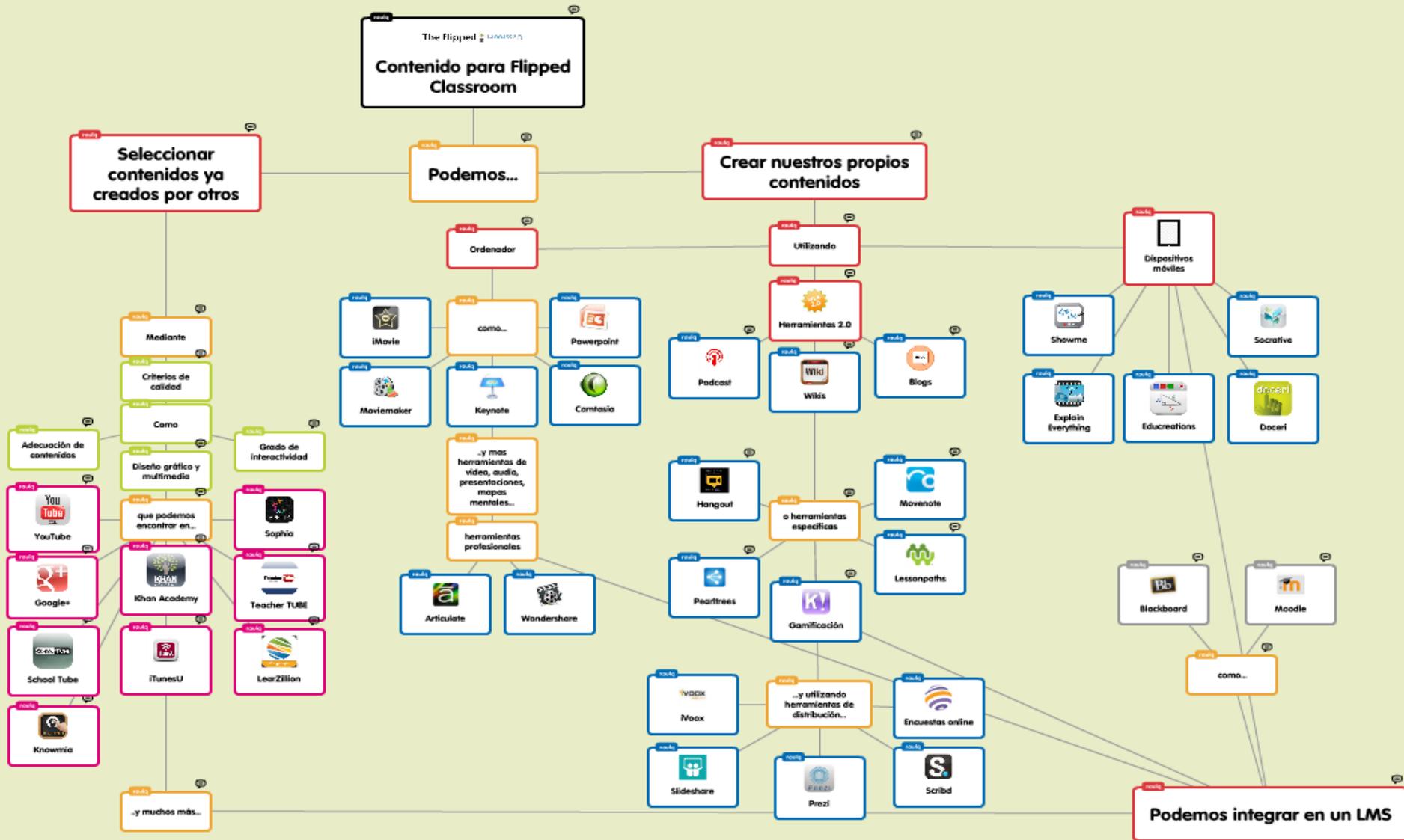
# ADVERTENCIA



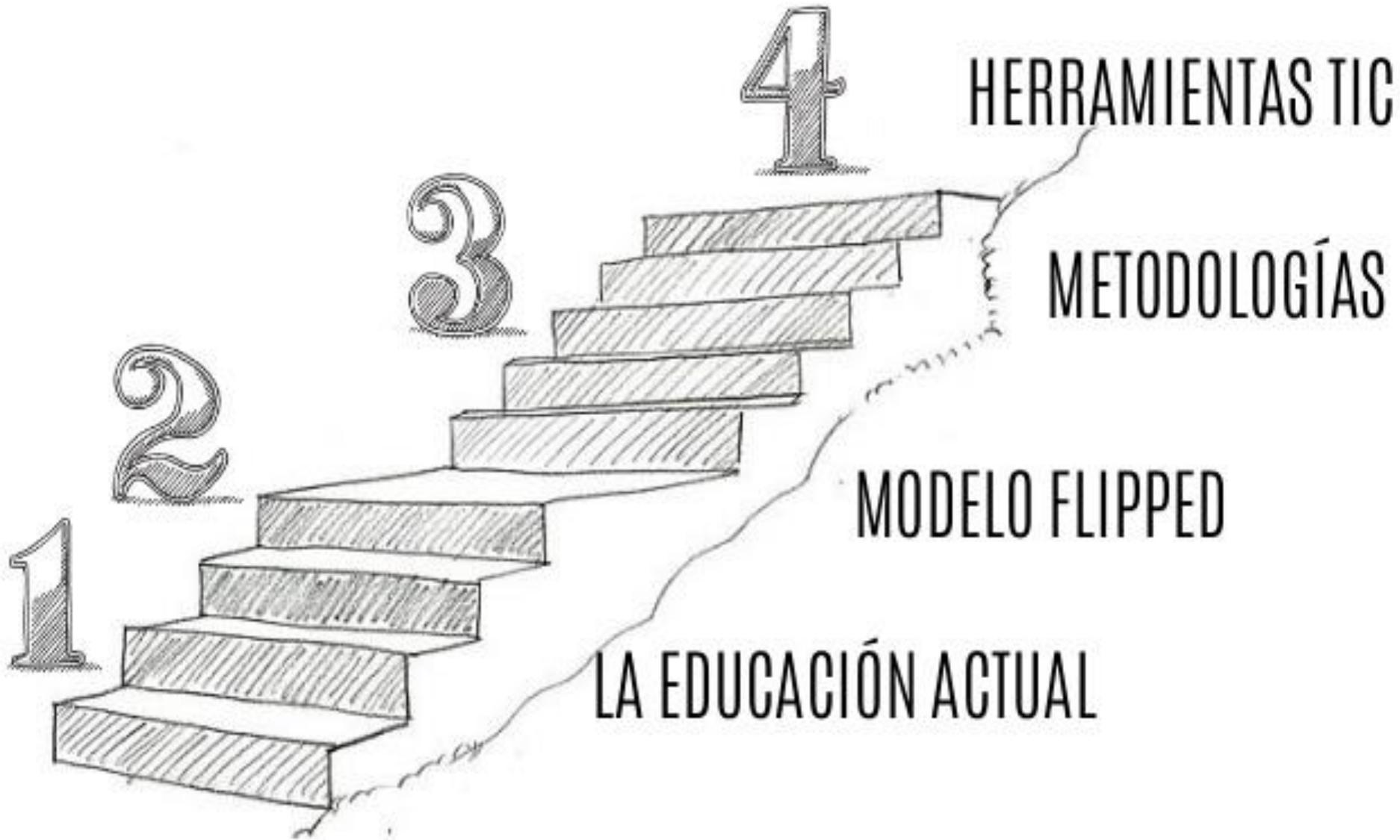
# ADVERTENCIA



# Las TIC Herramientas Pedagógicas



# Las TIC Herramientas Pedagógicas



# Las TIC Herramientas Pedagógicas



# Las TIC

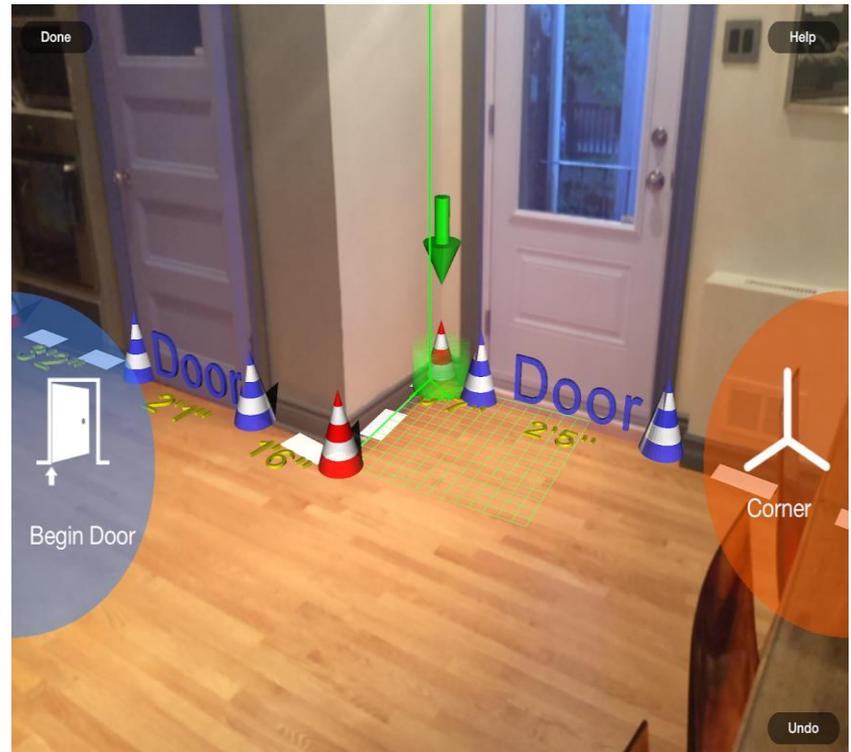


Dispositivos  
móviles





# MagicPlan





Available on the  
**App Store**



GET IT ON  
**Google play**



Available at  
**amazon appstore**  
for Android



**Windows Store**

# Contador de Calorías diarias





# MMH Calculator

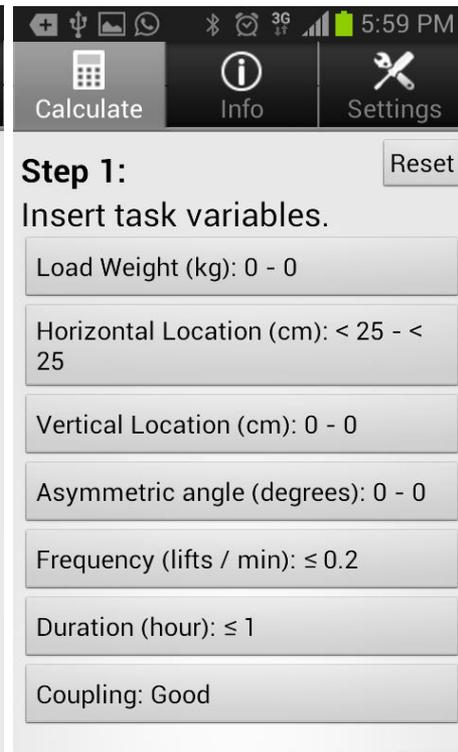


**MMH Calculator**  
Free  
INTERGO • human factors ..

DESINSTALAR    ABRIR

500 Descargas    4,5 ★    Salud y bienestar    Similares

INTERGO hv • Human





# Lift Right



**< New Lift** CLEAR

	origin	destination
Horizontal	0.62	0.56
Vertical	0.85	0.96
Rotation	1.00	0.90
Distance	0.94	
Frequency	0.65	
Coupling	1.00	

	Recommended Weight Limit (lbs)	Lift Index
ORIGIN	16.42	1.95
DESTINATION	15.08	2.12

Copiado al portapapeles

**New Lift** CLEAR

Horizontal (in)	16	18
Vertical (in)	10	25
Rotation (deg)	0	30
Lifts/min	2	
Duration	< 1 hr 1-2 hr 2-8 hr	
Coupling	good fair poor	
Object Weight	32	

**Calculate**

**< Back**

Horizontal Angle

**Vertical Location**

The distance (inches/cm) from the hands to the floor. Measure this at the beginning (origin) and end (destination) of the lift.

Measure



Available on the  
**App Store**



GET IT ON  
**Google play**

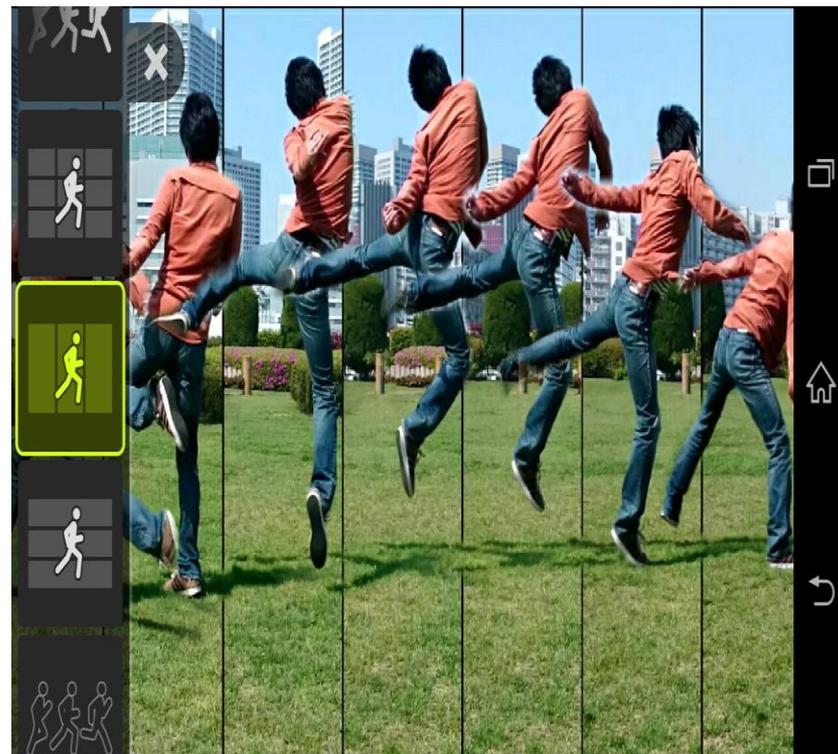


Available at  
**amazon appstore**  
for Android



**Windows Store**

# Motion Shot





Available on the  
**App Store**



GET IT ON  
**Google play**



Available at  
**amazon appstore**  
for Android



**Windows Store**

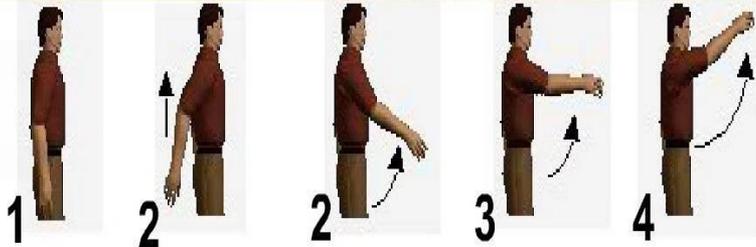
# HSE.Ergo.RULA

## UPPER ARM POSTURE:

U ARM ▾

NEXT ▶

- \* If shoulder is raised or upper arm is abducted, add 1 mark
- \* If upper arm is leaned or supported it's weight, decrease 1 mark



Score A

3

Score C

6

RULA SCORE

7

3

Score B

6

Score D

Result

NEXT ▶

**Investigation and changes are required immediately**



# Carga postural - REBA



**Análisis de posturas forzadas (método REBA)**

NIPO: 272-15-034-1

GOBIERNO DE ESPAÑA  
MINISTERIO DE EMPLEO Y SEGURIDAD SOCIAL  
INSTITUTO NACIONAL DE SEGURIDAD E HIGIENE EN EL TRABAJO

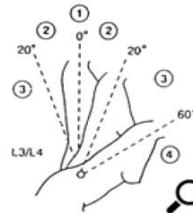


## Carga postural-REBA

### Entrada de datos:

Por favor seleccione y rellene todos los campos del formulario.

### Flexión / Extensión del tronco:



1. Erguido

2. 0° - 20° flexión o extensión



## Carga postural-REBA

### Entrada de datos:

Por favor seleccione y rellene todos los campos del formulario.

### Flexión / Extensión del tronco:



1. Erguido

2. 0° - 20° flexión o extensión

3. 21° - 60° flexión o > 20° extensión

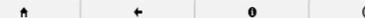
4. > 60° flexión

¿Existe torsión o inclinación lateral?

Sí

No

[Siguiente](#)





HSE.Ergo.@WAS

Owas No: 2

Task code: 

2	1	2	2	01
---	---	---	---	----

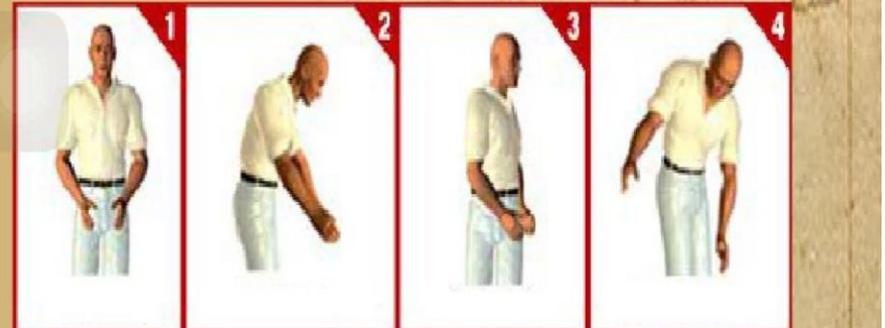
Trunk  
Arm  
Leg  
Force  
Work phase

RESULTS  
NEXT

2- Slightly harmful - corrective action should be taken during next regular review of work methods

Trunk position:

TRUNK





Available on the  
**App Store**



GET IT ON  
**Google play**



Available at  
**amazon appstore**  
for Android



**Windows Store**

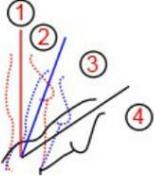
# Rapid Entire Body Assessment



ScreenTrunk



?



Add 1 - 4 points according to the degree of flexion / extension

**Extras: Add 1 if twisted or side flexed**

Trunk Score      Legs

Screen1

## Rapid Entire Body Assessment



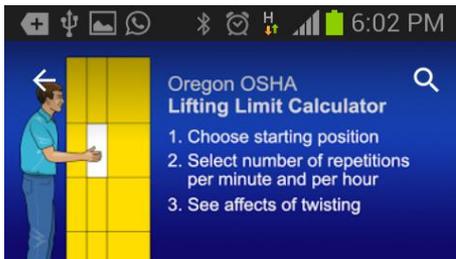
Start

About REBA

About MHI



# Safe Lifting Calculator



## Safe Lifting Calculator

Oregon DCBS

DESINSTALAR

ABRIR



Descargas



14

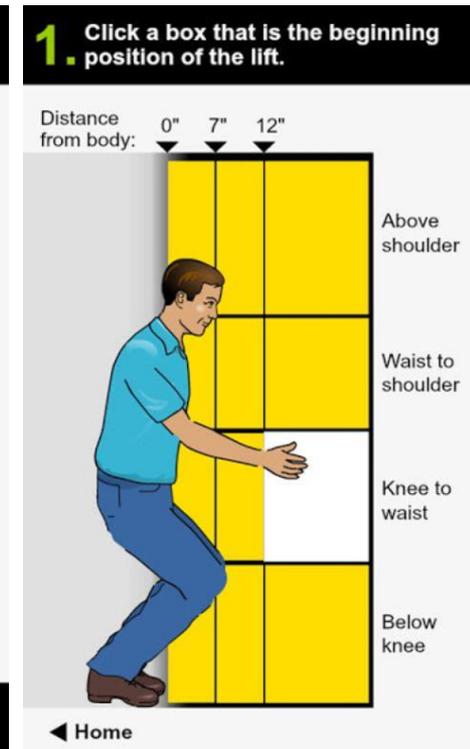
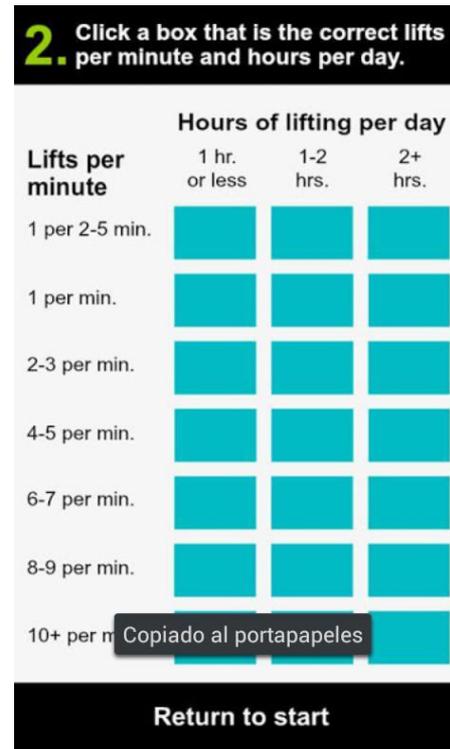
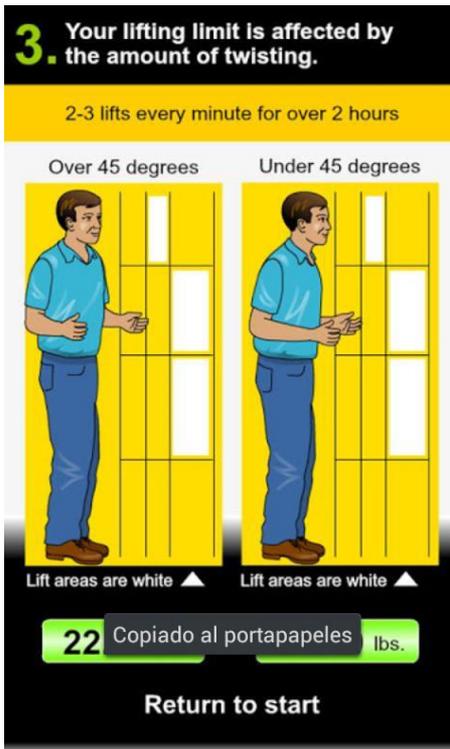


Salud y bienestar



Similares

Oregon OSHA Fasy Lift





Available on the  
**App Store**



GET IT ON  
**Google play**

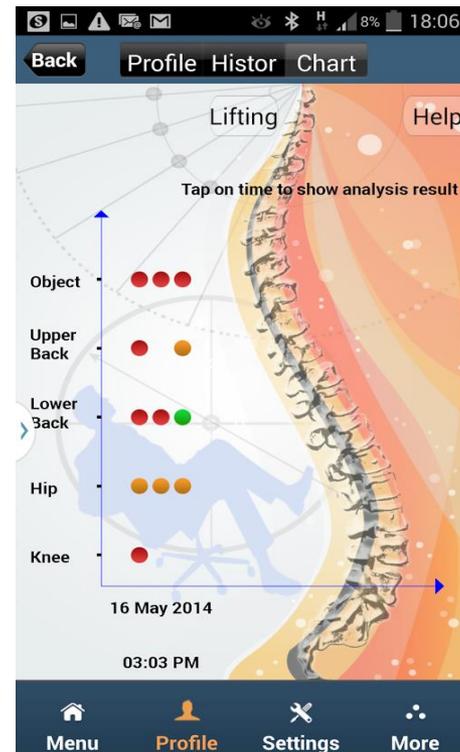
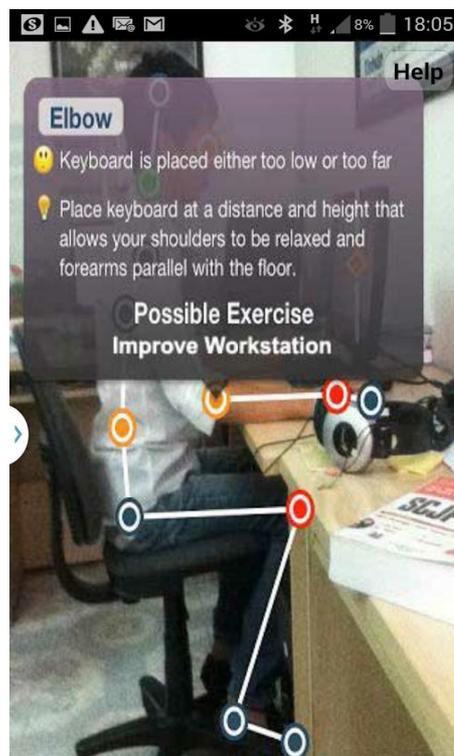
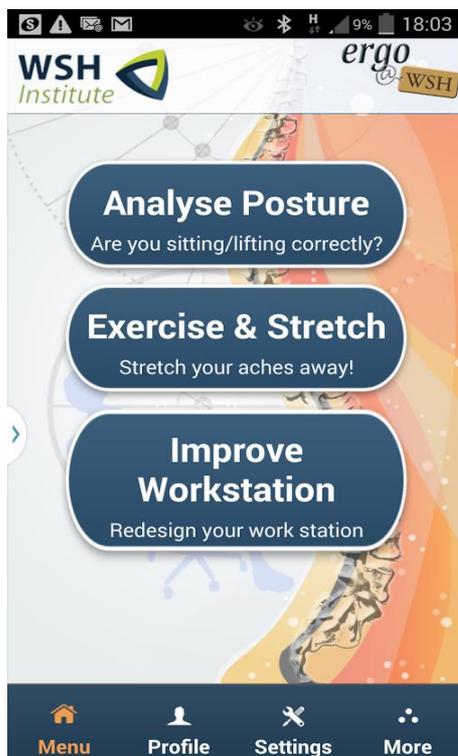


Available at  
**amazon appstore**  
for Android



**Windows Store**

ergo@W SH





# Posture Check

歡迎使用



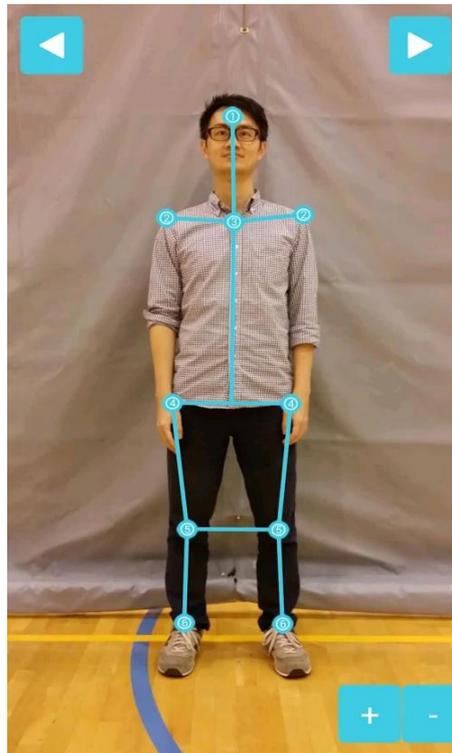
好知勢  
Posture  
Check

開始

記錄

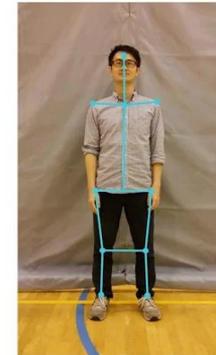
脊醫列表

Created By CityU Apps Lab & CDAHK



結果

以下結果僅供參考



## 正面站姿分析

頭部: 無偏側

肩膀: 左邊肩膀稍高

盤骨: 無偏側

膝蓋: 左右平衡

腳部: 先天性膝內翻



## 側面站姿分析

頭部: 輕微傾前

肩膀: 圓肩或寒背

整體: 站姿正常



Available on the  
**App Store**



GET IT ON  
**Google play**

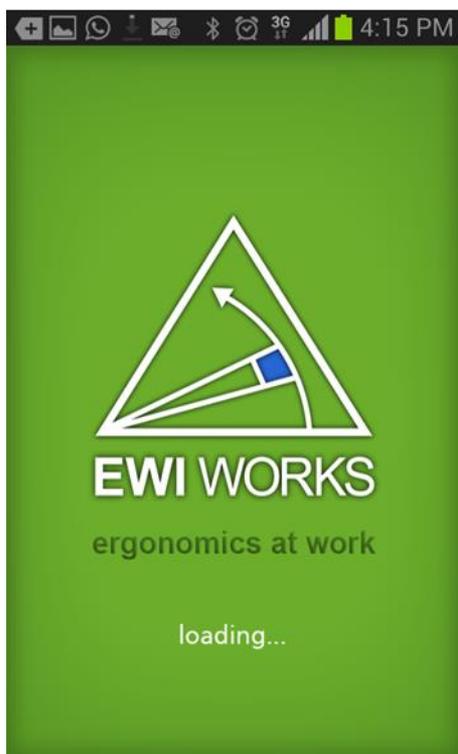


Available at  
**amazon appstore**  
for Android



**Windows Store**

## Office Ergonomics





# Ergometer

← Ergometer

**Ergometer**  
HazAnwar

DESINSTALAR    ABRIR

100 Descargas    3,7    Herramientas    Similares

NOVEDADES

- Added diagram
- Fixed scroll bar displaying on output page

Ergonometer

METRIC	IMPERIAL
Height of User	6 0
Length of Legs	2 10
Length of Arms	2 7

4  
5  
6  
7  
8  
9  
10  
11

Submit

Ergonometer

METRIC	IMPERIAL
Screen Distance	69.49 centimetres
Chair Height	449.07 millimetres
Keyboard Distance	0.44 metres
Screen Height	3 6 feet/inches

Convert

Ergonometer

METRIC	IMPERIAL
Height of User	millimetres
Length of Legs	centimetres
Length of Arms	metres

millimetres  
centimetres  
metres

Submit



# 3DSSPP

3dssApp

Off Results

Population Strength Percent Capable

Trunk Flexion		94
Shoulder		99

Low back Compression: 3384N

Off Controls

Anthropometry

Sex:  Male  Female

Height: 175.1 cm

Weight: 83.9 Kg

Select Hands or Hips to Change Posture 1/5

3dssApp

On Results

On Controls

Select Hands or Hips to Change Posture 4/5

3dssApp

Off Results

Population Strength Percent Capable

Trunk Flexion		97
Shoulder		99

Low back Compression: 1699N

On Controls

Select Hands or Hips to Change Posture 2/5



# K+N Ergo App

← K+N Ergo App

**K+N Ergo App**  
König + Neurath AG

DESINSTALAR ABRIR

1 MIL 4,3 Herramientas Similares

K+N Ergo App by König + Neurath

NOVEDADES

KÖNIG + NEURATH  
Büromöbel-Systeme  
www.koenig-neurath.de

**K+N ERGO.APP**  
© 2012 König + Neurath  
Alle Rechte vorbehalten

Version 1.1

De En

KÖNIG + NEURATH

Table level

Wiederholen Vorschau Verwenden

KÖNIG + NEURATH

! Chair and desk too low. König + Neurath are happy to advise.

New Test Rotate Contact Evaluate



Available on the  
**App Store**



GET IT ON  
**Google play**



Available at  
**amazon appstore**  
for Android



**Windows Store**

# Risk Assessor



Check your Hazards and Controls  
(and edit accordingly)





Available on the  
**App Store**



GET IT ON  
**Google play**

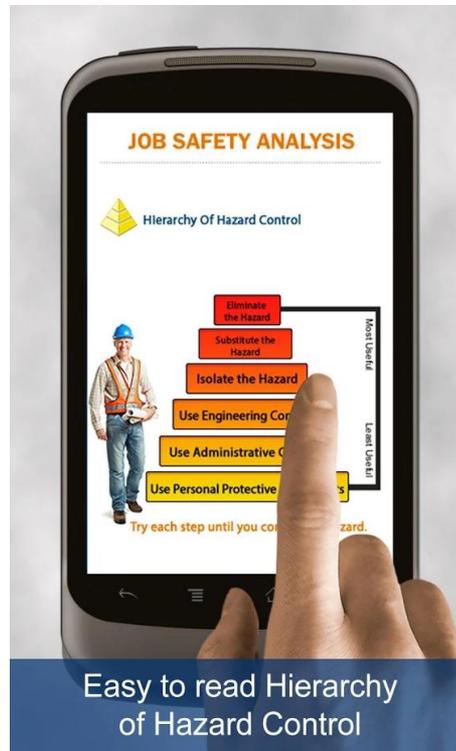


Available at  
**amazon appstore**  
for Android



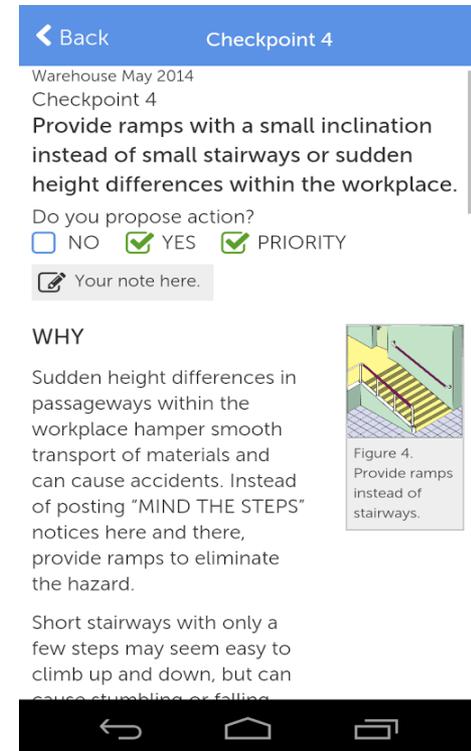
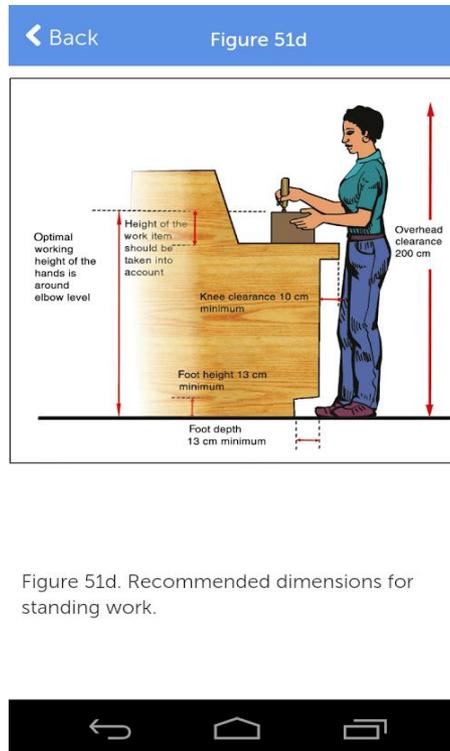
**Windows Store**

# Job Safety Analysis



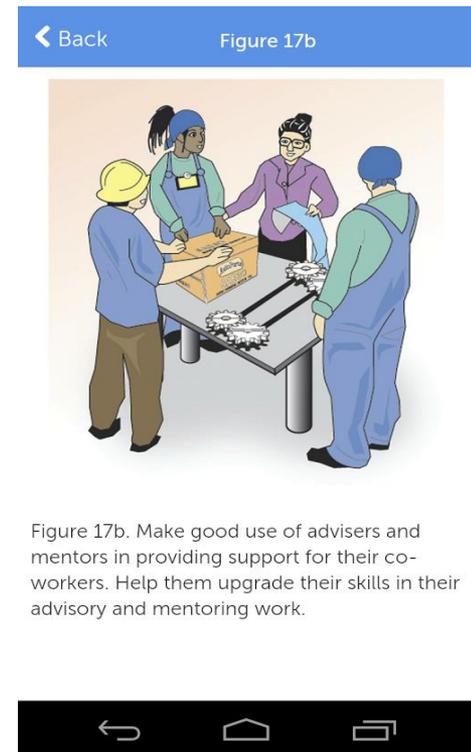
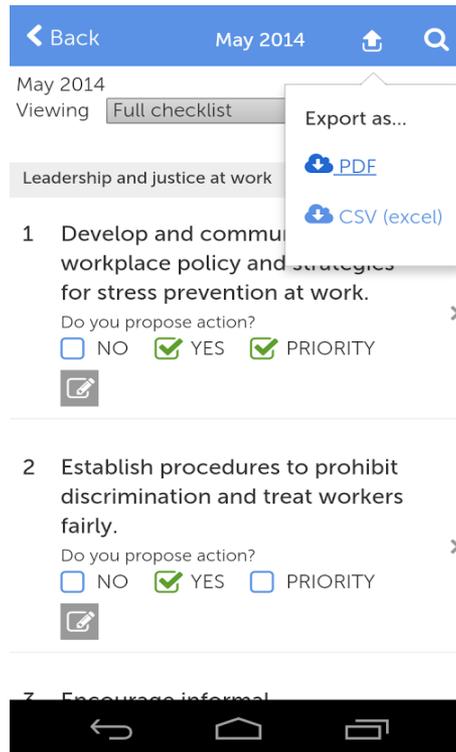
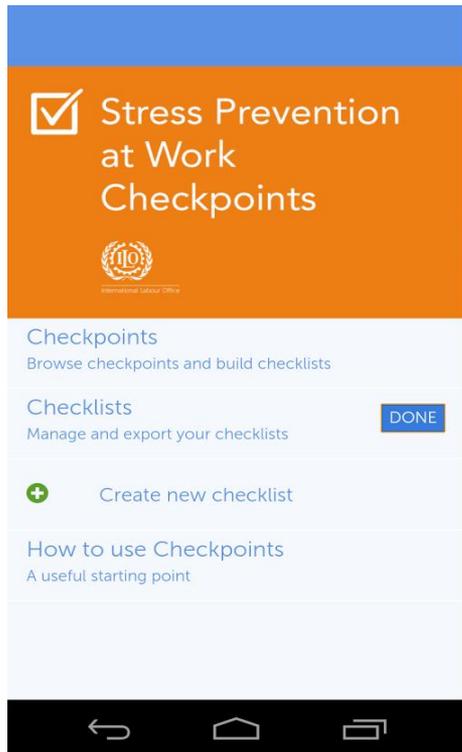


# IL@ Ergonomic Checkpoints





# IL@ Stress Checkpoints





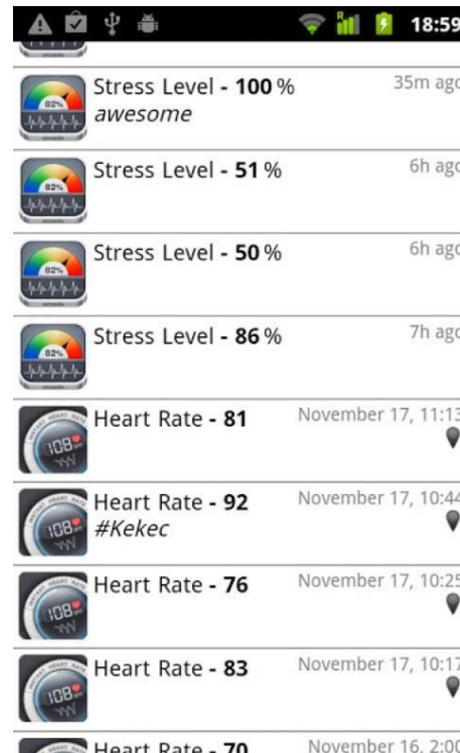
# Stress Check by Azumio



Stress Check measures your stress level by monitoring your heart rate

The process takes about 2 minutes. Please find a comfortable position and hold your phone steady during this time

Press START to start.



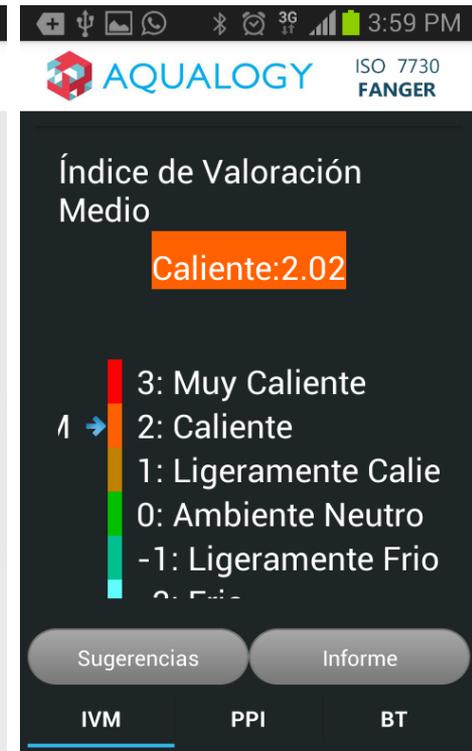
## Measuring

I'm analyzing your heart rate variability to calculate your stress level. The whole process takes about 2 minutes.





# Confort térmico





# luxómetro

luxómetro

Aplicaciones

- 1. luxómetro KHTSXR ★★★★★ GRATIS
- 2. Light Meter Mannoun.Net ★★★★★ INSTALADO
- 3. Lighting calculat.. Ettore Gallina ★★★★★ GRATIS
- 4. Luxómetro Carles Sanz ★★★★★ GRATIS
- 5. Easy Light Meter Symbol Mobile

LUX METER

luxómetro KHTSXR

INSTALAR

50 MIL 3,7 Herramientas Similares

Descargas 596

Teléfono inteligente tiene una luz

calibration X 1.0

3138 lux

Max	3138
Avr	479
Min	15

RESET Calib

calibration X 1.0

Calibration

428 X1.34

Max 456 X1.5

Avr 410

Min 300

Default Save Cancel

RESET Calib



# Sonómetro

← sonometro 🔍

Aplicaciones

1. Sonómetro - So...  
Smart Tools co.  
★★★★★ INSTALADO
2. Sound Meter PRO  
Mobile Essentials  
★★★★★ GRATIS
3. Sonómetro  
Netigen Tools  
★★★★★ GRATIS
4. Medidor de Deci..  
TACOTY APP  
★★★★★ GRATIS
5. Multi Measures  
SkvPaw Co..Ltd

← **Sound Meter** 🔍

**Sonómetro - Sound Meter**  
Smart Tools co.

DESINSTALAR ABRIR

**10** MILLONES **4,2** ★★★★★

Descargas 126,465 Herramienta Similares

Mide el ruido ambiental con

Sonóme... pro 📷 MENÚ

68 dB  
Smart Tools

Para restablecer los valores, mantén pulsado el centro de la rueda.

0 Sec 15 Sec 30 Sec (dB)

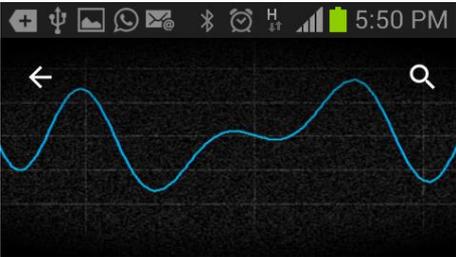
Sonóme... pro 📷 MENÚ

62 dB  
Smart Tools

- 90dB : Maquinaria de fábrica a 90cm
- 80dB : Calle concurrida, alarma de reloj
- 70dB : Tráfico intenso, teléfono sonando
- ▶ 60dB : Conversación normal a 90cm
- 50dB : Oficina silenciosa, calle silenciosa
- 40dB : Zona residencial silenciosa, parque
- 30dB : Susurro silencioso a 90cm



# Análisis de Vibraciones



Análisis de Vibraciones  
ENGIN

DESINSTALAR    ABRIR

Descargas    18    Herramientas    Similares

Una herramienta para

Vibrations Analysis

Please select the domain to show the signals in

Time domain

Time domain parameters

Frequency domain

Time Domain

X-axis    OFF

Copiado al portapapeles

Time Domain

Y-axis

X-axis    OFF

12:36 AM



# Max Protractor



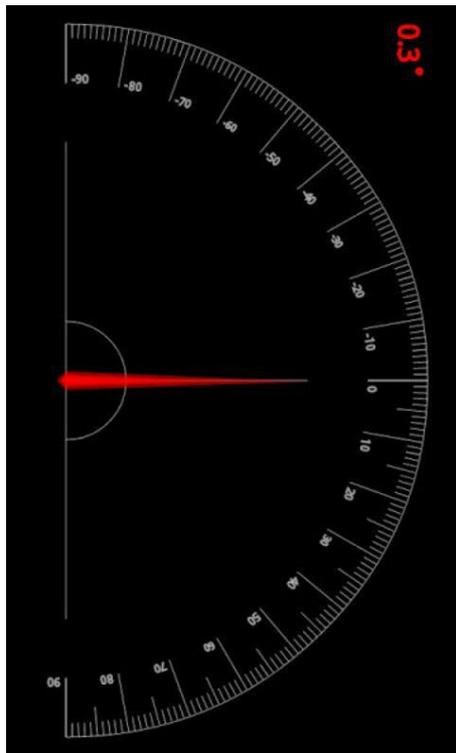
 **Max Protractor**  
Maxcom

[DESINSTALAR](#) [ABRIR](#)

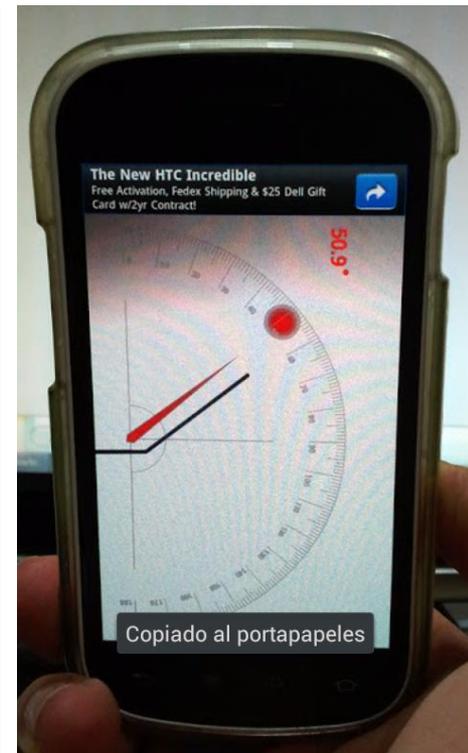
Descargas 439  Herramientas Similares

MaxProtractor



### Mode List

- Inclination Mode
- Camera Mode(180°)
- Camera Mode(360°)
- Touch Mode(180°)
- Touch Mode(360°)
- Plane Angle Mode(180°)
- Plane Angle Mode(360°)





# Tool Box ( Free)

**TOOLBOX**

Tool Box (Free) Maxcom

INSTALAR

500 MIL

4,3

Descargas 4,054 Herramienta Similares

ToolBox has everything just you want

**Tool Box**

Measuring Tools

Compass Leveler Measure Protractor

Vibrometer Mag Detec... Altimeter

Utility Tools

Flash Converter Magnifier Calculator

Abacus Counter Score Board Roulette

Time Tools

**Leveler**

P -0.3°

R -0.2°

Copiado al portapapeles

Set Origin Hold Restart

**Max Converter**

Kyrgyzstan Som KGS	Kyrgyzstan Som KGS
Ghanaian Cedi GHS	Ghanaian Cedi GHS
Australian Dollar AUD	Australian Dollar AUD
Aruba Florin AWG	Aruba Florin AWG
British Pound GBP	British Pound GBP

Exchange Rate

7 8 9

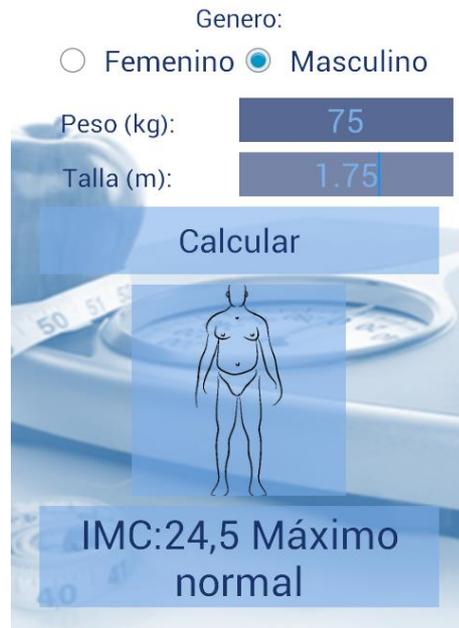
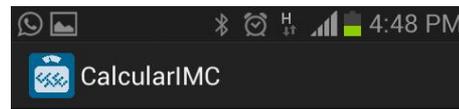
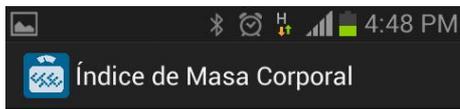
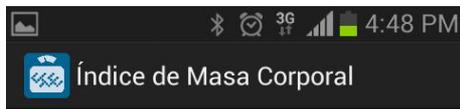
4 5 6

1 2 3

0 . SWAP



# SCE: Índice de Masa Corporal

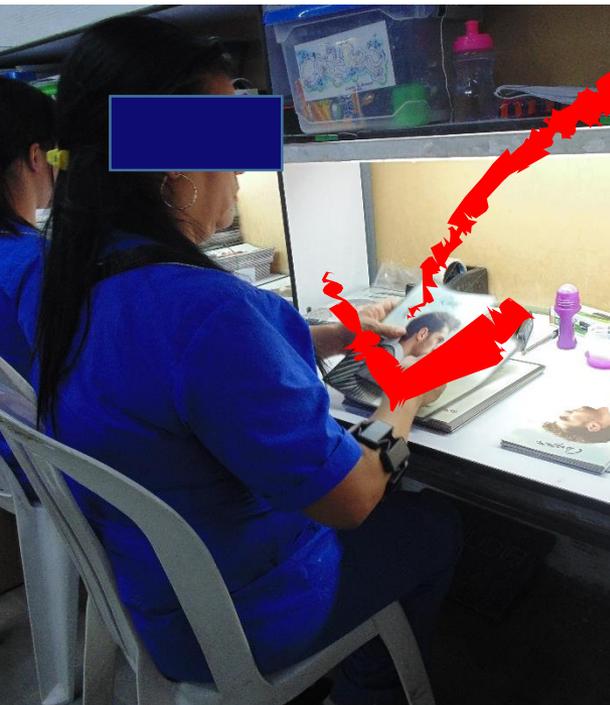
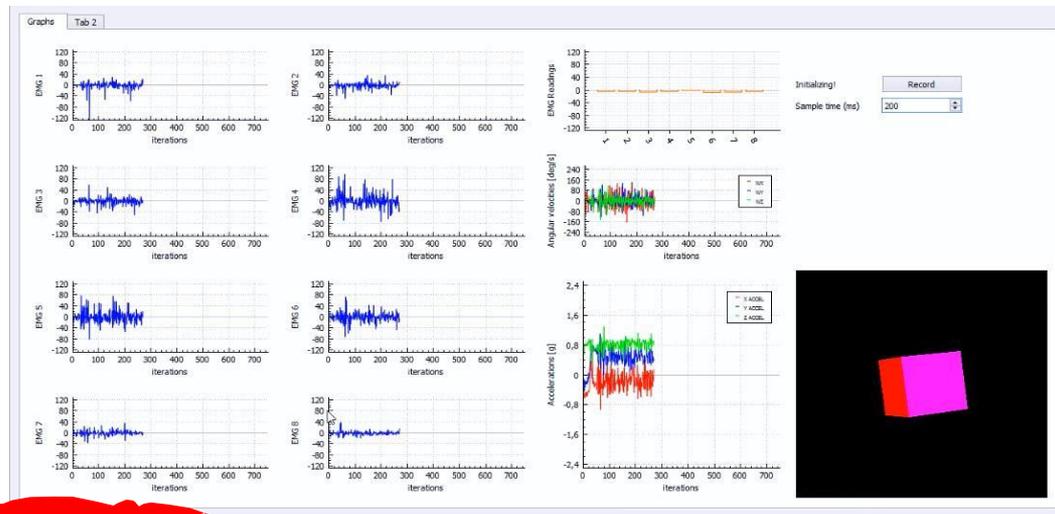


# Las TIC

## Dispositivos vestibles



# Dispositivos vestibulares



# Las TIC



Entornos  
virtuales 3D

Manufacturing Operations in Virtual Environments (MOVE)



*Antes de hacer algo, experimentalo en Realidad Virtual*

# Video 360°

Ambiente grabado en video que le permite al usuario experimentar y situarse en un escena real.

Usuario es guiado, permite movimiento

Monoscópico

Se puede ver en cualquier dispositivo

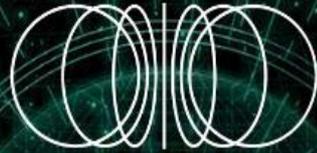
# Video 360°

<https://www.youtube.com/watch?v=HEElzZ7UjRg>

# Video 360°



# Video 360° inmersivo



facebook 360

## SPATIAL WORKSTATION

POWERED BY AUDIO 360

A free software suite for designing spatial audio for 360  
video and cinematic VR



# Realidad Virtual

Ambiente **generado** computacionalmente que le permite al usuario **experimentar** y situarse en un mundo completamente diferente

Usuario tiene el control, interacción y movimiento

Requiere dispositivos especiales

Estereoscópico o Monoscópico

# Realidad Virtual



# Dispositivos vestibulares

## Interfaces Hápticas

feedback de fuerza

feedback táctil Feedback propioceptivo





# Simlab Composer



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*The Virtual Reality edition of SimLab Composer 8 is designed to take advantage of VR revolution for end users, and developers building specialized VR experiences with high quality visualizations of 3D software solutions.*

# Tecnomatix Manufacturing Simulation and Validation

The image displays the Tecnomatix Manufacturing Simulation and Validation software interface. The top portion shows a 3D virtual factory floor with two workers in blue and green shirts handling large black circular components on a wooden workbench. The bottom portion displays a detailed process flowchart and a Gantt chart. The flowchart shows two parallel paths of operations: 'Pick Up', 'Cut', 'Grind', 'Apply', 'Stack', and 'Apply'. The Gantt chart below it shows the timing of these operations for two different parts, with a 'Stack' operation occurring later in the process. A control panel on the right side of the interface includes various simulation settings and a 'Start' button.

# Tecnomatix Manufacturing Simulation and Validation



# CATIA V5



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3DS Academy

Get Software

CATIA V5 Student Edition

## CATIA V5 STUDENT EDITION

# Realidad Aumentada

Ambiente **enriquecido** computacionalmente que le permite al usuario **experimentar** y **visualizar** un mundo real, complementado con imágenes 3d.

Usuario tiene el control, interacción.

Incorpora información en el espacio.

No requiere dispositivos especiales

Estereoscópico o Monoscópico



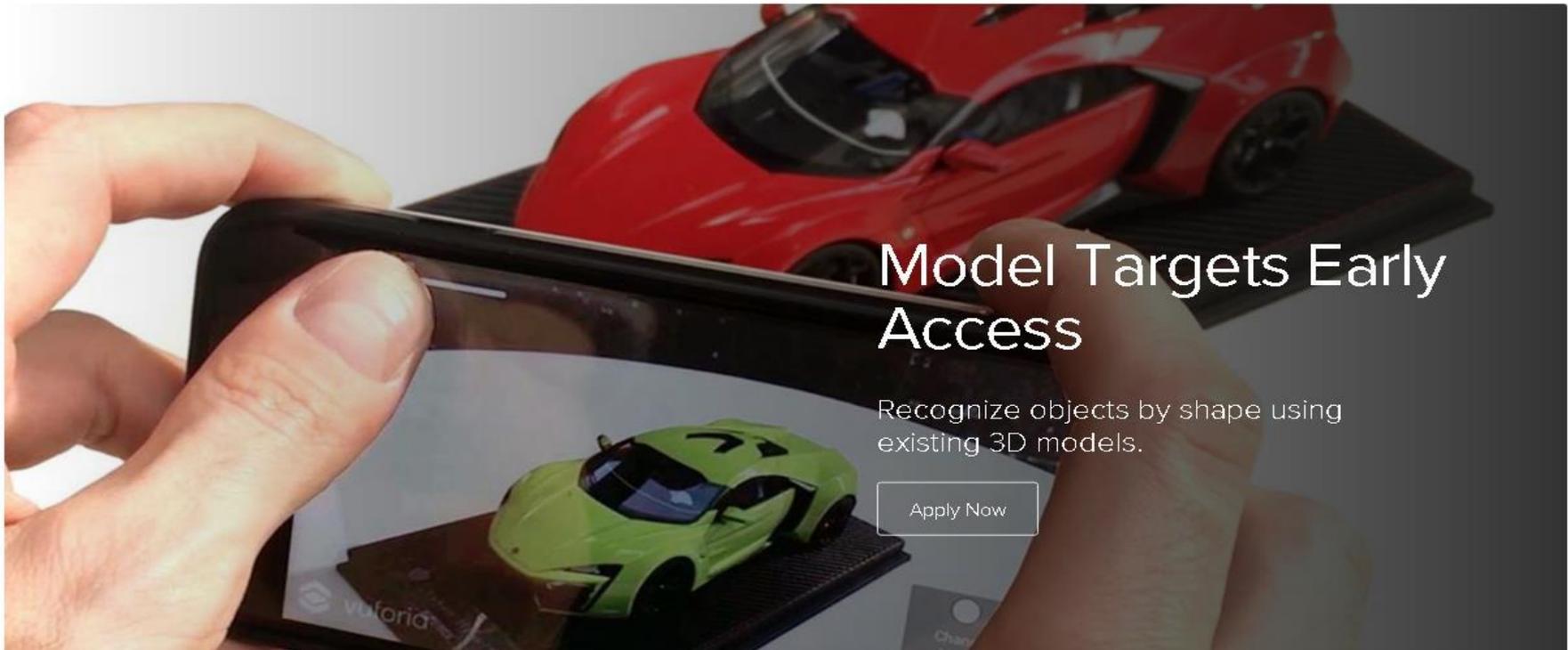


# Realidad Aumentada

## Vuforia



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### Model Targets Early Access

Recognize objects by shape using existing 3D models.

[Apply Now](#)

# Realidad Aumentada

## Augment

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## Bring a physical presence to online shopping

*Display products across ecommerce platforms in life-like, 3D augmented reality to drive sales and engagement.*

Retailers

Manufacturers

# Realidad Aumentada

## Aurasma



[Get Started](#)

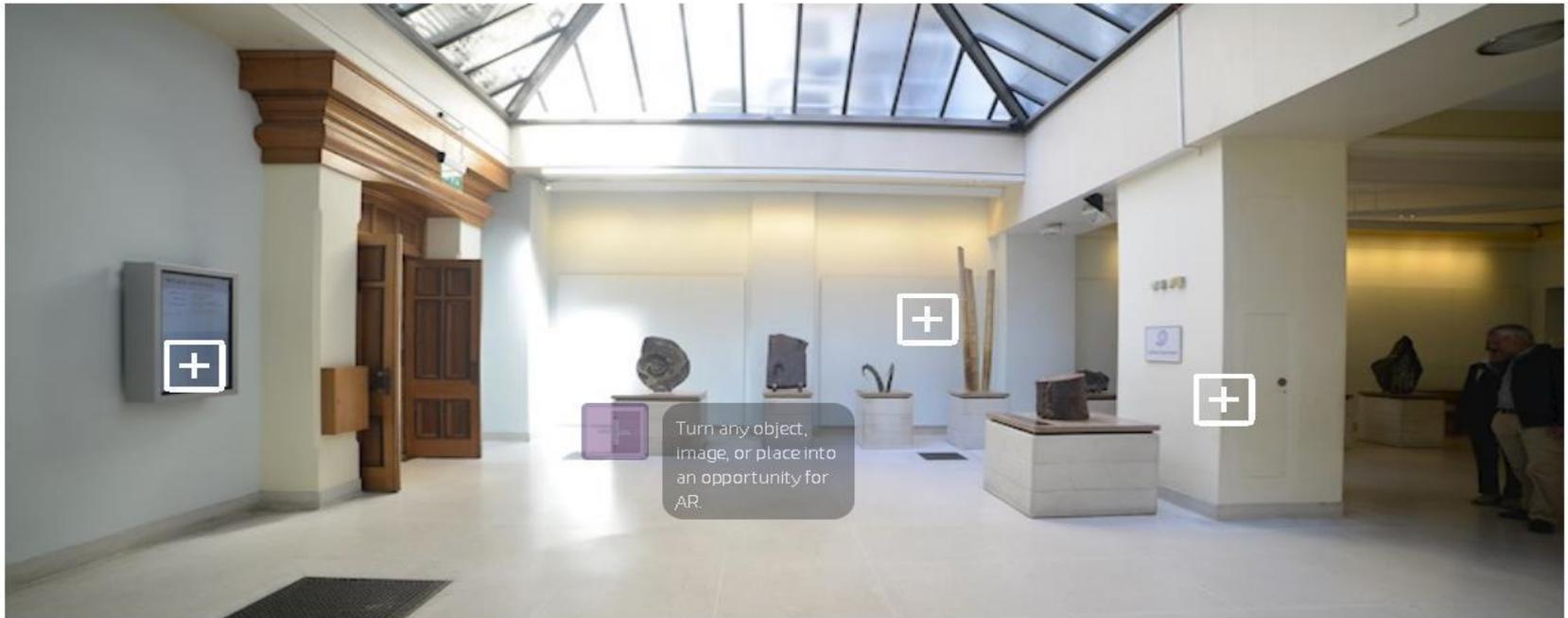
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# Ergonomía y las TICs

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