

MANUFACTURA INTERACTIVA

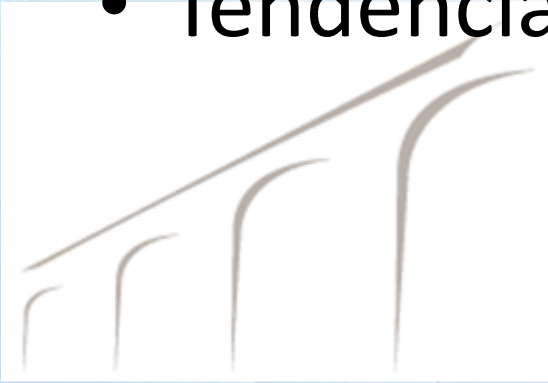


Dr. César Cárdenas
ccardena@itesm.mx



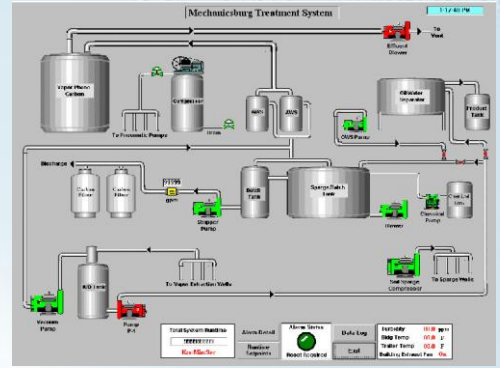
Agenda

- Evolución de la interacción
- Nuevos modos de Interacción con BCIs
- Exploraciones personales
- Manufactura Interactiva
- Tendencias tecnológicas en HCI



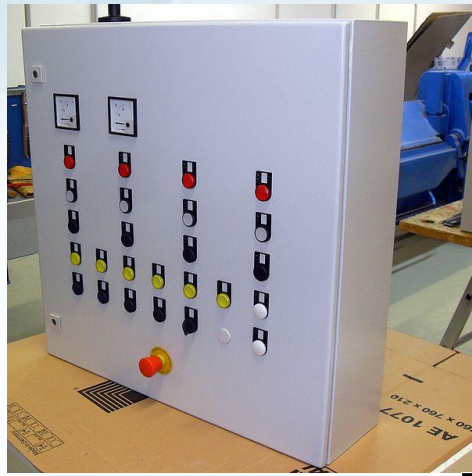
Evolución de la Interacción

- Human-Computer Interface -> Interaction (HCI)
- Human-Machine Interaction (HMI)
 - Man-Machine Interaction (MMI)
 - Operator Interface Console (OIC)
 - Human-Robot Interaction (HRI)
- Robot-to-Robot Interaction (R2RI)
- Computer in the Human Interaction Loop (CHIL)
- Human-to-Human Interaction (H2HI)
- Algunas evoluciones:
 - De interfaces virtuales a interfaces reales.
 - Incremento en la inteligencia de las interfaces (máquinas -> robots -> geminoids)
- Propuestas de generalizaciones:
 - **Natural systems to artificial systems interactions (NS2ASI)**
 - **Artificial systems to natural systems interactions (AS2NSI)**
 - **NS2NSI**
 - **AS2ASI**



HMI

Ejemplos: el panel frontal de un vehículo (cluster), un avión o el panel en una instalación industrial, etc.



R2RI (cooperación)

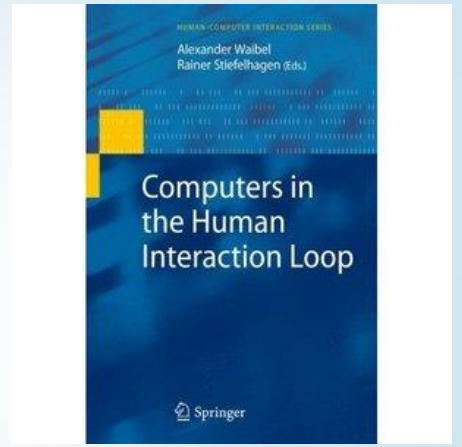
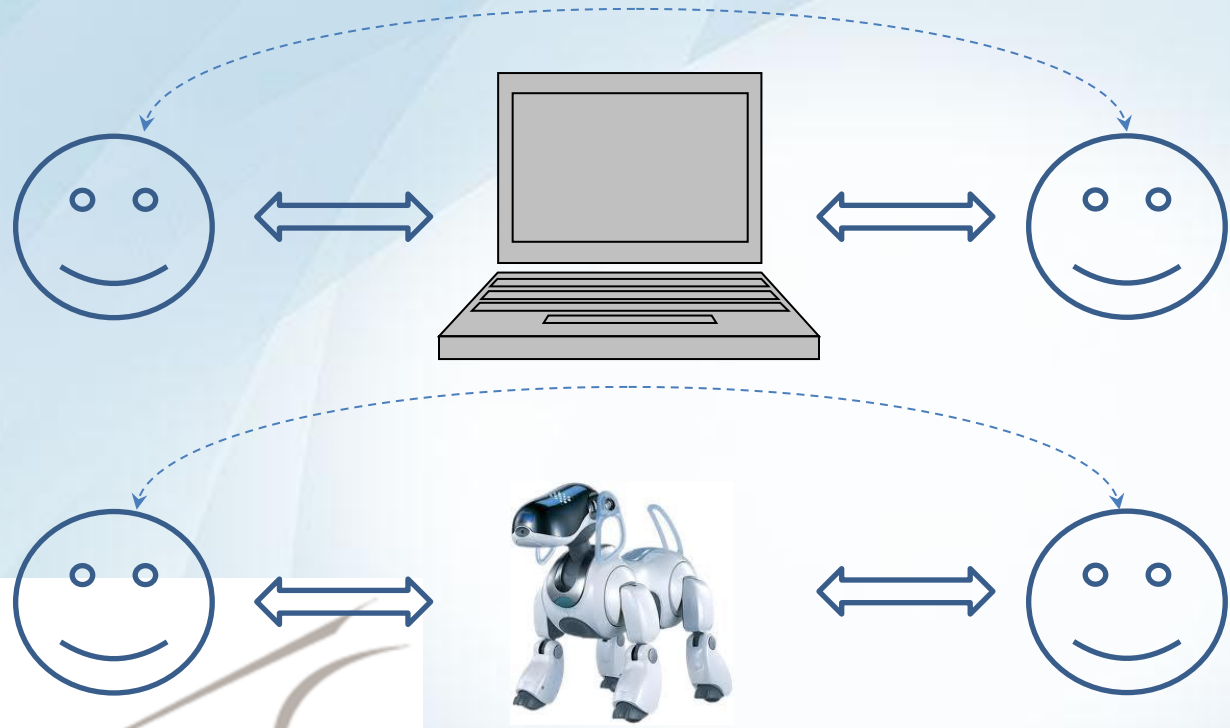
Internet for Robots Lets Bots Share Instructions and Learn from One Another

By Clay Dillow Posted 02.02.2011 at 2:08 pm 9 Comments



Robot to RoboEarth to Robot *RoboEarth*

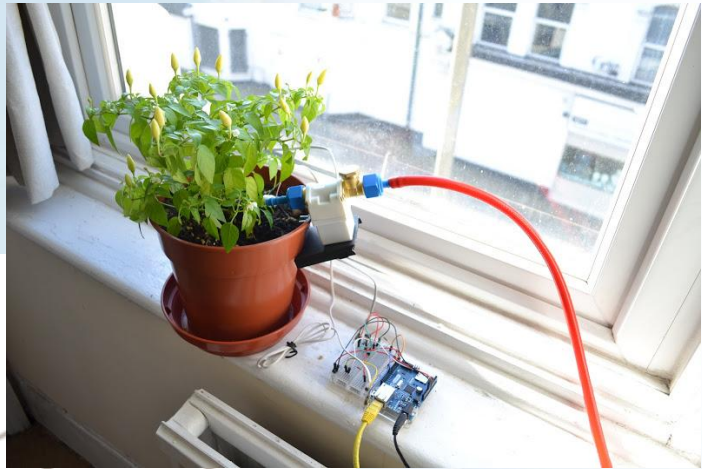
CHIL -> RHIL o MHIL



H2NSI

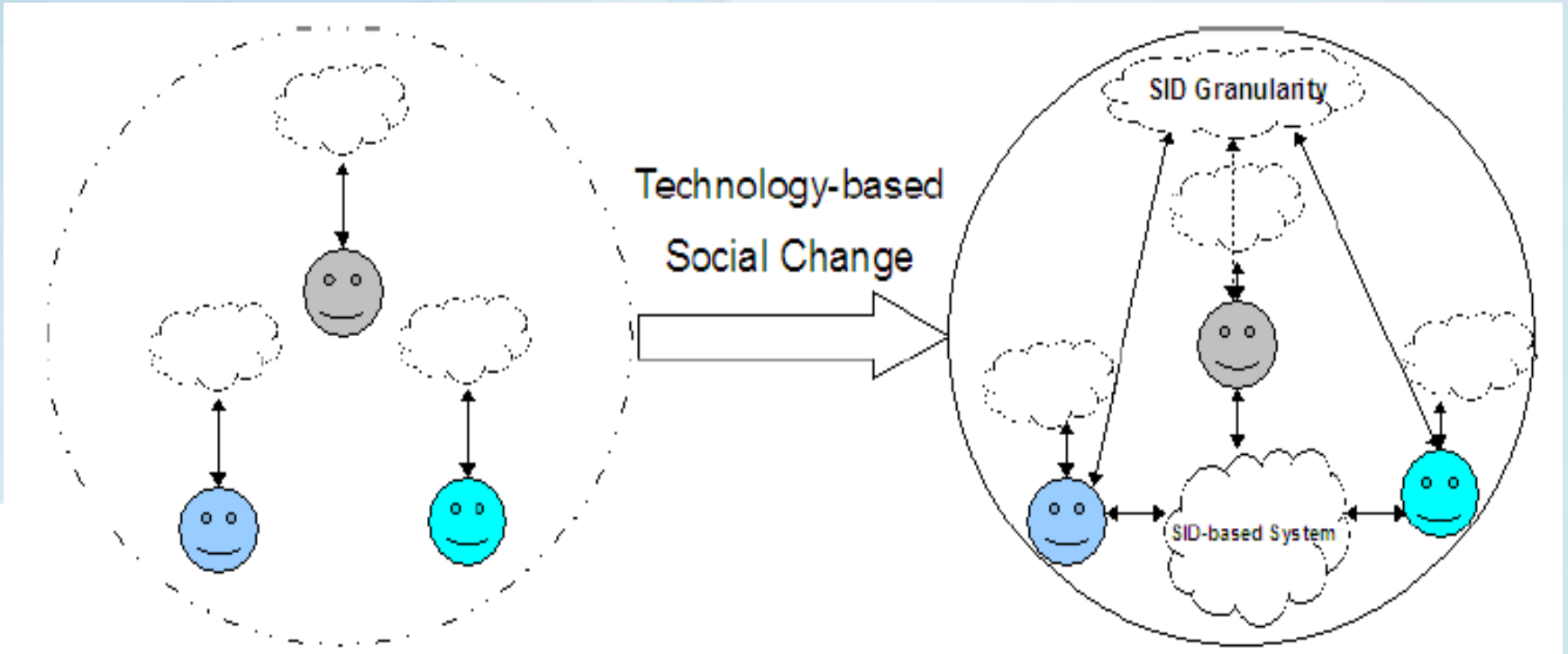
ARDUINO-POWERED PLANT CAN WATER ITSELF,
THANK YOU VERY MUCH

By Matt Garun — July 26, 2012

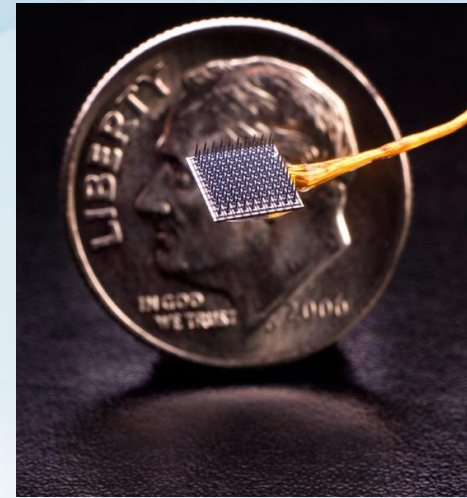
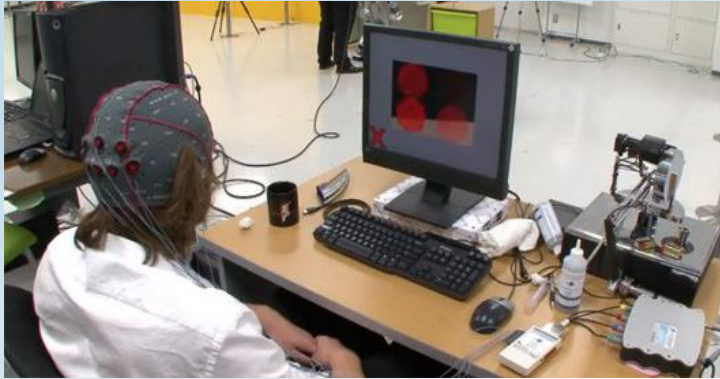


H2HI

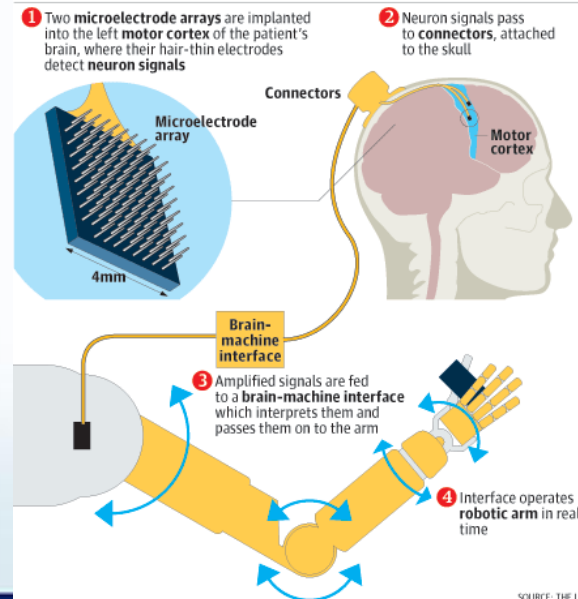
Technology for Social Change (Cárdenas et al. 2008)



HRI con BCIs de Bajo Costo



Connecting brain and arm



SOURCE: THE LANCET

NS2NSI

Brain-to-brain interface transmits information from one rat to another

Electronically linked brains could facilitate rehabilitation and revolutionise computing



Image: Katie Zhuang/ Miguel Nicolelis/ Duke University

Brain-to-brain interface lets rats share information via internet

Rats thousands of miles apart collaborate on simple tasks with their brains connected through the internet

Ian Sample, science correspondent
The Guardian, Friday 1 March 2013
[Jump to comments \(449\)](#)



A rat with a brain-to-brain implant responds to a light (circled) by pressing a lever. Its motor cortex was connected to that of another rat. Photograph: Scientific Reports

Brown unveils novel wireless brain sensor

by Staff Writers
Providence RI (SPX) Mar 05, 2013

A team of neuroengineers based at Brown University has developed a fully implantable and rechargeable wireless brain sensor capable of relaying real-time broadband signals from up to 100 neurons in freely moving subjects. Several copies of the novel low-power device, described in the Journal of Neural Engineering, have been performing well in animal models for more than year, a first in the brain-computer interface field. Brain-computer interfaces could help people with severe paralysis control devices with their thoughts.

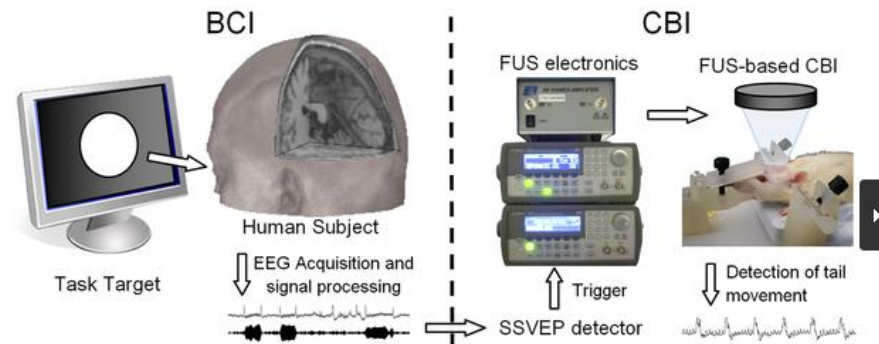


Engineers Arto Nurmikko and Ming Yin examine their prototype wireless, broadband neural sensing device. Credit: Fred Field for Brown University.

RESEARCH ARTICLE

Non-Invasive Brain-to-Brain Interface (BBI): Establishing Functional Links between Two Brains

Seung-Schik Yoo, Hyungmin Kim, Emmanuel Filandrianos, Seyed Javid Taghaddo...





Cyber-Physical Systems



Son sistemas que tienen una integración (combinación de, y una coordinación entre) del sistema computacional, de redes y de los procesos físicos.

- Son computadoras embebidas y redes que monitorean y controlan los procesos físicos con lazos de retroalimentación donde los procesos físicos afectan los cálculos y viceversa.
- Los CPSs integran la dinámica de los procesos físicos con los de soportes de código, de redes, proporcionando abstracciones y modelado, diseño, y técnicas de análisis para una integración total de las tres disciplinas.
- El precursor de los CPSs son los sistemas embebidos.
- Los CPSs son una red de elementos que interactúan con entradas y salidas físicas.
- Se piensa que esta integración incrementará en los CPSs la:
 - Adaptabilidad
 - Autonomía
 - Eficiencia
 - Funcionalidad
 - Confiabilidad
 - Seguridad
 - Usabilidad
- Potenciando sus aplicaciones:
 - Intervención
 - Precisión
 - Operación en ambientes peligrosos
 - Coordinación
 - Eficiencia
 - Aumento de capacidades humanas

Educación de Ciencias en Espacios Abiertos

Cárdenas, Hernández (en proceso)

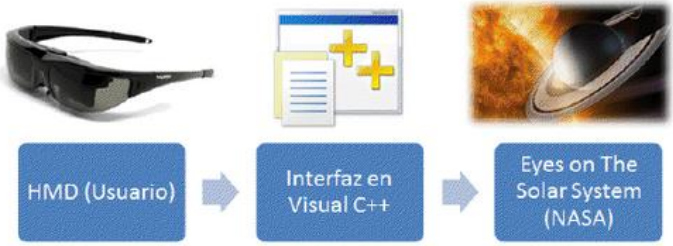


Diagrama del escenario 2, experimento 1 (VR).

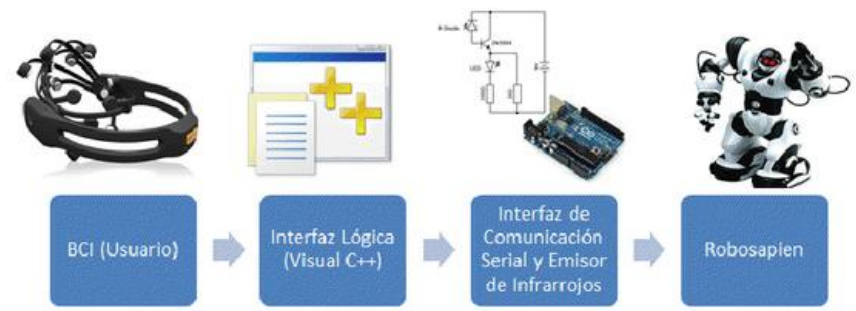


Diagrama del escenario 3, experimento 1. (BCI).



Escenario 2 (VR), experimento 1, en la 26ª EXPOCYTEQ.

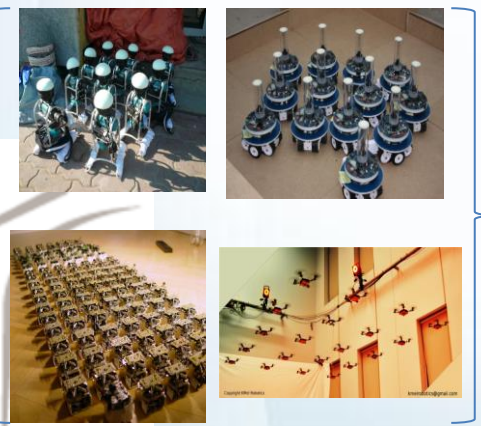


Escenario 3 (BCI), experimento 1, en la 26ª EXPOCYTEQ.



Space Avatar

Cárdenas, Hernández, Mendieta (2013)



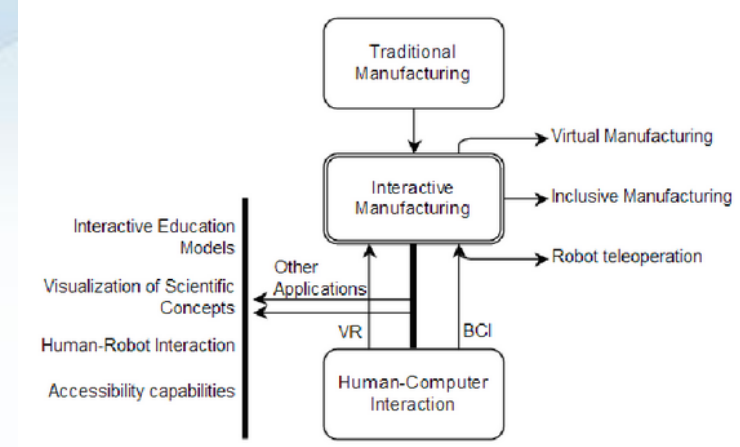
INTERNATIONAL SPACE UNIVERSITY
ISU

**SPACE TECHNOLOGY AND TELE-REACH:
 BENEFITING HUMANITY ON EARTH AND BEYOND**

PRELIMINARY PROGRAM
 17TH ISU ANNUAL INTERNATIONAL SYMPOSIUM
 Strasbourg, Tuesday 5th – Thursday 7th March 2013

Manufactura Interactiva

Cárdenas, Hernández (en proceso)



HCI aplicada a la Manufactura Avanzada.





Interactive Design and Manufacturing

Development, handling, and design of highly realistic, multi-sensorial virtual prototypes for improving decision-making in manufacturing.

- Interdisciplinary research, technical issues, industrial implementations.
- Mechatronics, design and manufacturing sciences, numerical and mechanical engineering, and virtual reality.
- Domains:
 - Interactive methods for engineering
 - Interaction and preliminary design
 - Basic theories for interactive design and manufacturing
 - Interactive decision support techniques
 - Interactive simulation and virtual reality
 - Human factors in interactive design and manufacturing
 - Tools integration
 - Interactive manufacturing
 - Instruments for interactive simulations
 - Specific applications of interactive design and manufacturing techniques
 - Modelling for interactive design and manufacturing





Interactive Manufacturing



Virtual Manufacture

- Virtual prototyping for training in industry,
- Virtual prototyping for risk prevention,
- Virtual prototyping for product tooling,
- Virtual prototyping for product maintenance,
- Virtual Quality control,
- Virtual control and inspection,

Integration in Manufacturing

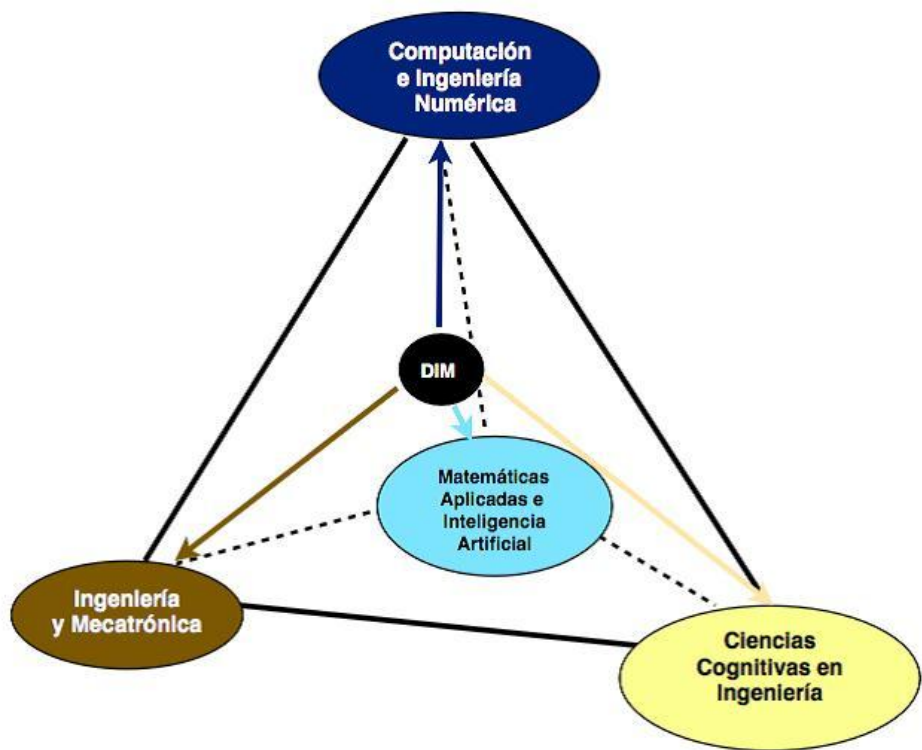
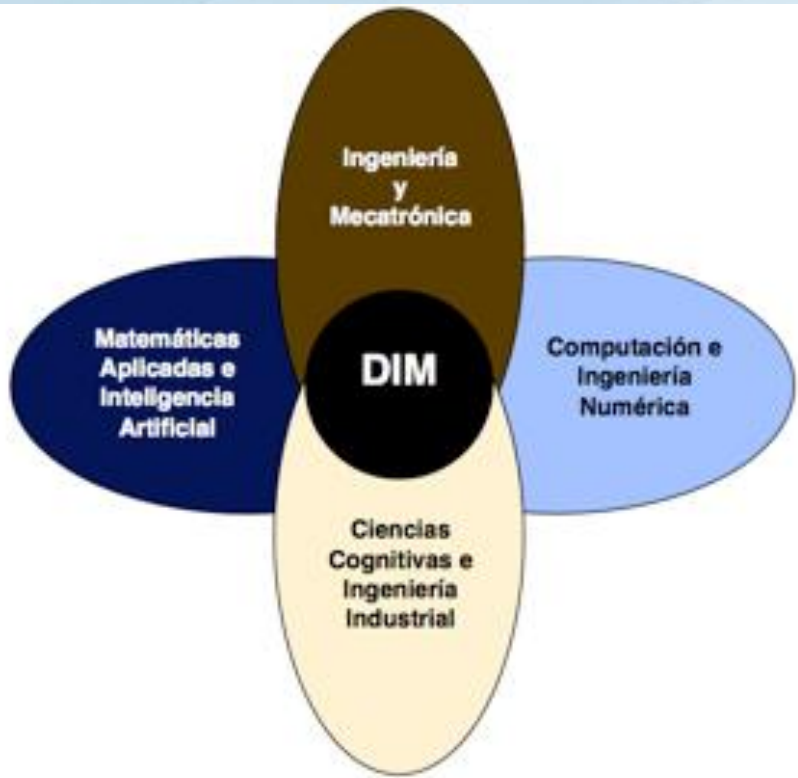
- Virtual Reality and Robotics,
- Virtual Reality and operation ergonomics,
- Improvement of process quality
- Remote and cooperative Teleoperations through virtual environments.

Virtual Manufacturing Process

- Modeling of manufacturing process,
- Virtual process planning,
- CAM and Virtual Reality,

Diseño y Manufactura Interactivos

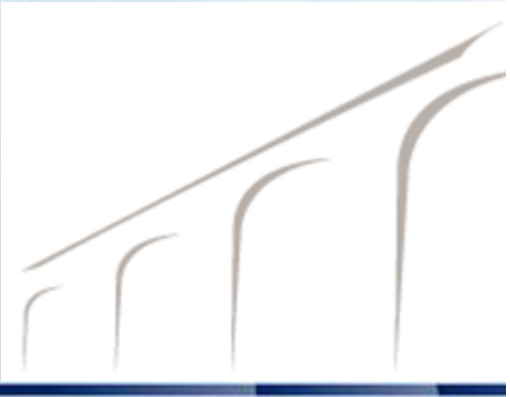
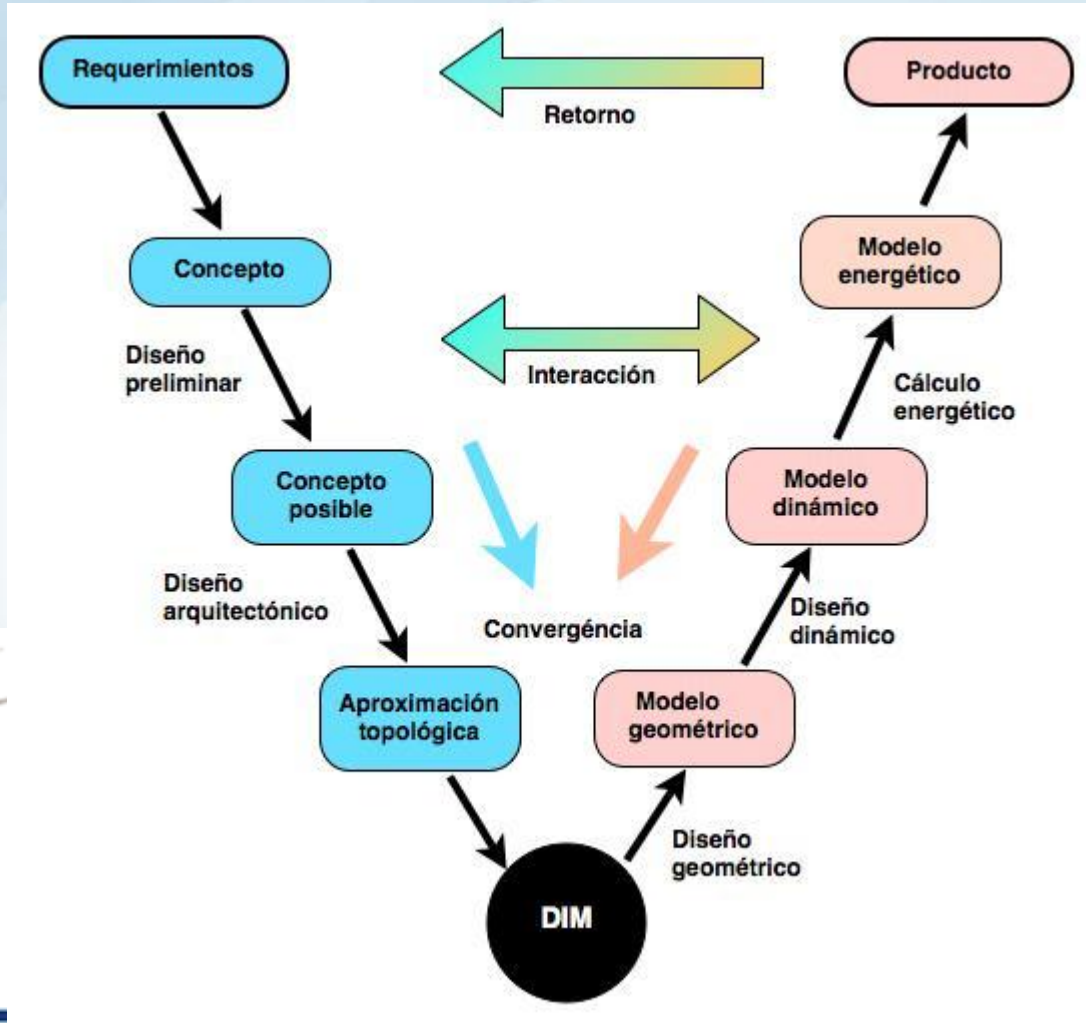
Posgrado Binacional México-Francia @ CINVESTAV





Diseño y Manufactura Interactivos

Posgrado Binacional México-Francia @ CINVESTAV





Infraestructura de Redes

- Se requiere de redes industriales de alta velocidad para que los medios no perjudiquen la percepción en la calidad de la experiencia.
- Un resumen de la evolución de las redes de control industriales, en particular el Internet Industrial, se puede consultar en:

– http://www.cudi.edu.mx/primavera_2013/presentaciones/Evolucion_DelInternetIndustrial_CesarCardenas.pdf

PREGUNTAS Y RESPUESTAS



Dr. César Cárdenas
ccardena@itesm.mx