

Industria 4.0: Encuentra la tecnología que necesitas

17:50 h. **Simulación**

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Research

Training & Teaching

Innovation & Transfer

Efficient management



Instituto Universitario de Investigación
**Biocomputación y Física
de Sistemas Complejos**
Universidad Zaragoza

Biology
& Biochemistry

Biophysics

Physics

Computing

BIFI areas

BIOCHEMISTRY & MCB

Mycobacterium Tuberculosis
Development of Antimicrobials and Mechanisms of resistance
Studies on Microcystin and its Technology
Genetic regulation and physiology of cyanobacteria
Genetics and pig metabolism
(GENOXPHOS)
Apoptosis and metabolism
Plant Evolutionary Biology

PHYSICS

Spin Glasses
Complex Systems and Networks (COSNET Lab)
Statistical-physics modelling of biomolecules
Molecular dynamics and electronic structure
Nonlinear Models and Complexity

BIOPHYSICS

DeveProtMol: Protein folding and molecular design
Flavoenzymes: action mechanisms and biotechnology
Biomolecular Interactions
Protein glycosylation and its role in disease
Physical modeling of biomolecules
Molecular dynamics and electronic structure
Protein Misfolding and Amyloid Aggregation
Clinical Diagnosis and Drug Delivery

COMPUTING

Citizen Science
High Performance Computing (HPC)
Grid and Cloud Computing
Special Purpose Computers
Data Analysis, Advanced visualization and Software Development

>Computing Infrastructures_

Cluster

Terminus

815 cores, 3TB

Shared memory

Memento, 3072 cores, 12 TB

Spanish Supercomputing Network

RES - Caesaraugusta, 512 cores

Grid

Aragrid, 1000cores

Piregrid, 248 cores

Cloud

OpenStack

500 cores

Cesaraugusta 3

2080 cores- 8GPU

7,31 TB RAM

288 TB Storage

Open Stack Cloud

1800 cores

20 TB RAM

500 TB Storage

Volunteer Computing

Ibercivis

30000 volunteers

10000 core/day

Special Purpose Computers

Janus I , 256 FPGAs

**Janus II*

HPC infrastructure



MEMENTO

3072 cores AMD64
12 TB RAM
Iband QDR 40 Gbps
51 TB storage
25,8 TFLOPS R_{peak}



RED ESPAÑOLA DE
SUPERCOMPUTACIÓN



Infraestructuras
Científicas y Técnicas
Singulares



CIERZO

2080 cores Intel 64 + 8 x Tesla
K40 + 2 x GPU Xeon Phi 5110P
7,31 TB RAM
Iband FDR 56 Gbps
288 TB storage
80 TFLOPS R_{peak}



TERMINUS

996 cores Intel 64
3 TB RAM
GE + Iband
12 TB storage
8 TFLOPS R_{peak}

Data Center

- 100 m² (main room) + 40 m² (repair area)
- Electrical power 250 kW
- UPS 320 KVA (diesel generator projected)
- Redundant cooling. Fancoils connected to central water cooling system (geothermal enabled)
- Stand-alone system 76kW
- Direct free-cooling 24.000 m³/h
- Network connectivity: 10Gbps link from data center to the Internet (ESpanix)
- Access floor
- Fire detection & fighting system
- Security (restricted access RFID-based, webcam and 24h surveillance)
- PLC-automated and monitored 24x7x365 via
- email, SMS & GSM

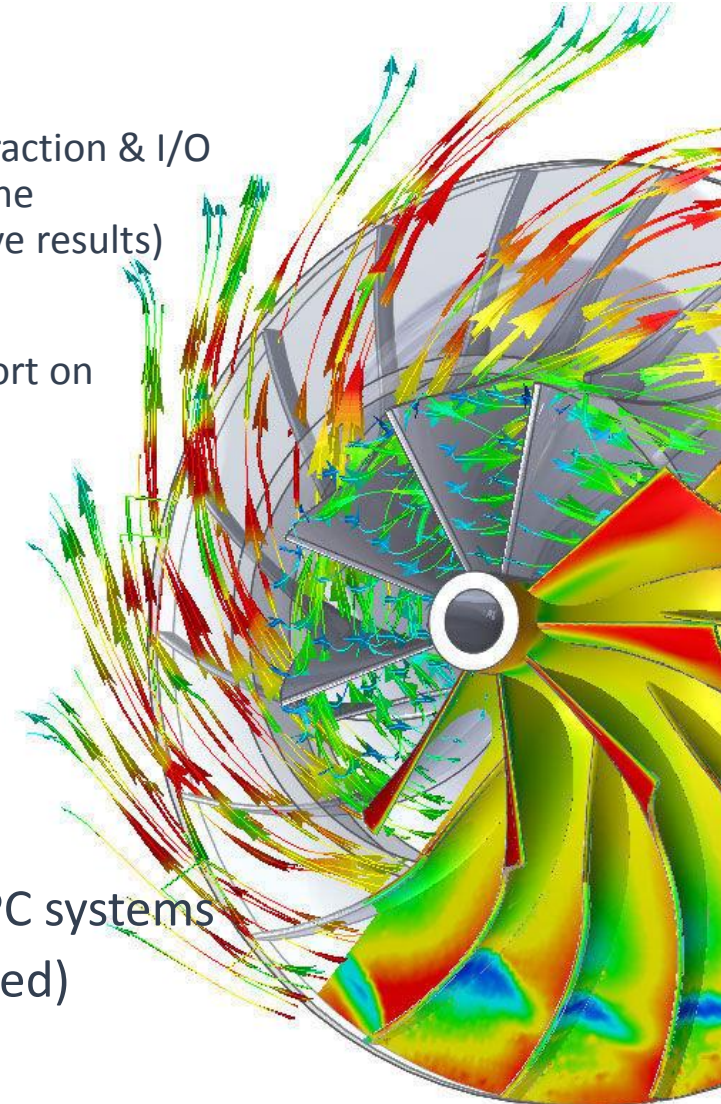


- Computing service

- Remote access (SSH) to login server
 - User-friendly GNU/Linux environment. Easy and fast interaction & I/O from anywhere. Set of basic commands to interact with the supercomputer (submit a simulation, check status, retrieve results)
- Account creation (free).
 - 100 GB, SW compiling and installation, Training and support on parallelization and debugging
- Pay per use (price per CPU hour)
- Special requirements:
 - Additional storage quota
 - High availability of resources
 - Porting and parallelization (coding)

- Hosting service

- Integrate your own computing resources in our HPC systems
- Pay per CPU hosted (discount if resources are shared)



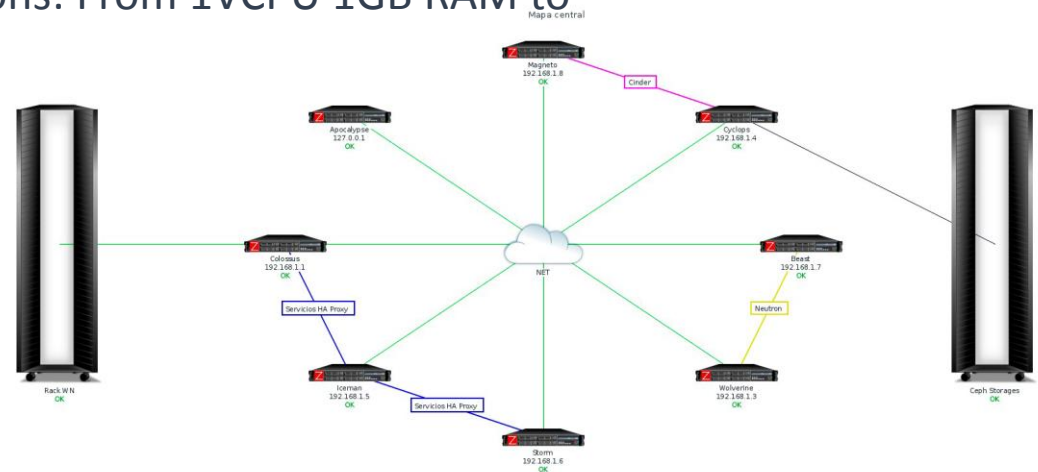
Cloud Services

(IaaS) Infrastructure as a Service

- Possibility to deploy and manage your own virtual infrastructure as root.
- Virtual servers with different configurations: From 1VCPU 1GB RAM to 24VCPU 240GB RAM.
- Block and Object Storage.

Big Data PaaS (Platform as a Service)

- Sahara project integration with
- Colossus Openstack
- Provision of data processing frameworks (such as Hadoop, Spark, Storm, Cloudera...)
- Easy virtual cluster management via Horizon Web User Interface



Cloud consultancy: ad-hoc service Infrastructure migration and deployment.



cloudera





CENTRO DE INNOVACION DIGITAL en HPC-Cloud y Sistemas Cognitivos para Robótica, Logística y Procesos Industriales Inteligentes

Digital Innovation HUB. Ecosistema (PYMES, grandes empresas, start-ups, investigadores, aceleradoras e inversores, etc.) cuyo objetivo es crear las **mejores condiciones para el éxito empresarial a largo plazo para todos los** involucrados y que asegure que cada empresa (pequeña o grande, de alta tecnología o no) pueda aprovechar las **oportunidades digitales**.

Características DIH

- **Ventanilla única** que ayuda a las empresas a ser más competitivas (procesos de negocio/producción, productos o servicios) utilizando tecnologías digitales.
- Basados en **Centros de Competencia** que ofrecen: infraestructura tecnológica, proporcionan acceso a los últimos conocimientos, experiencia y tecnología para apoyar a sus clientes con el piloto, la prueba y la experimentación con las innovaciones digitales.
- Proporcionan **apoyo financiero y de negocios** para implementar estas innovaciones, si es necesario en toda la cadena de valor.

European Projects



I4MS

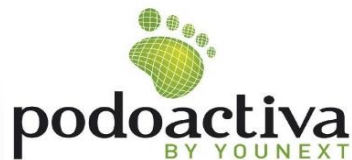


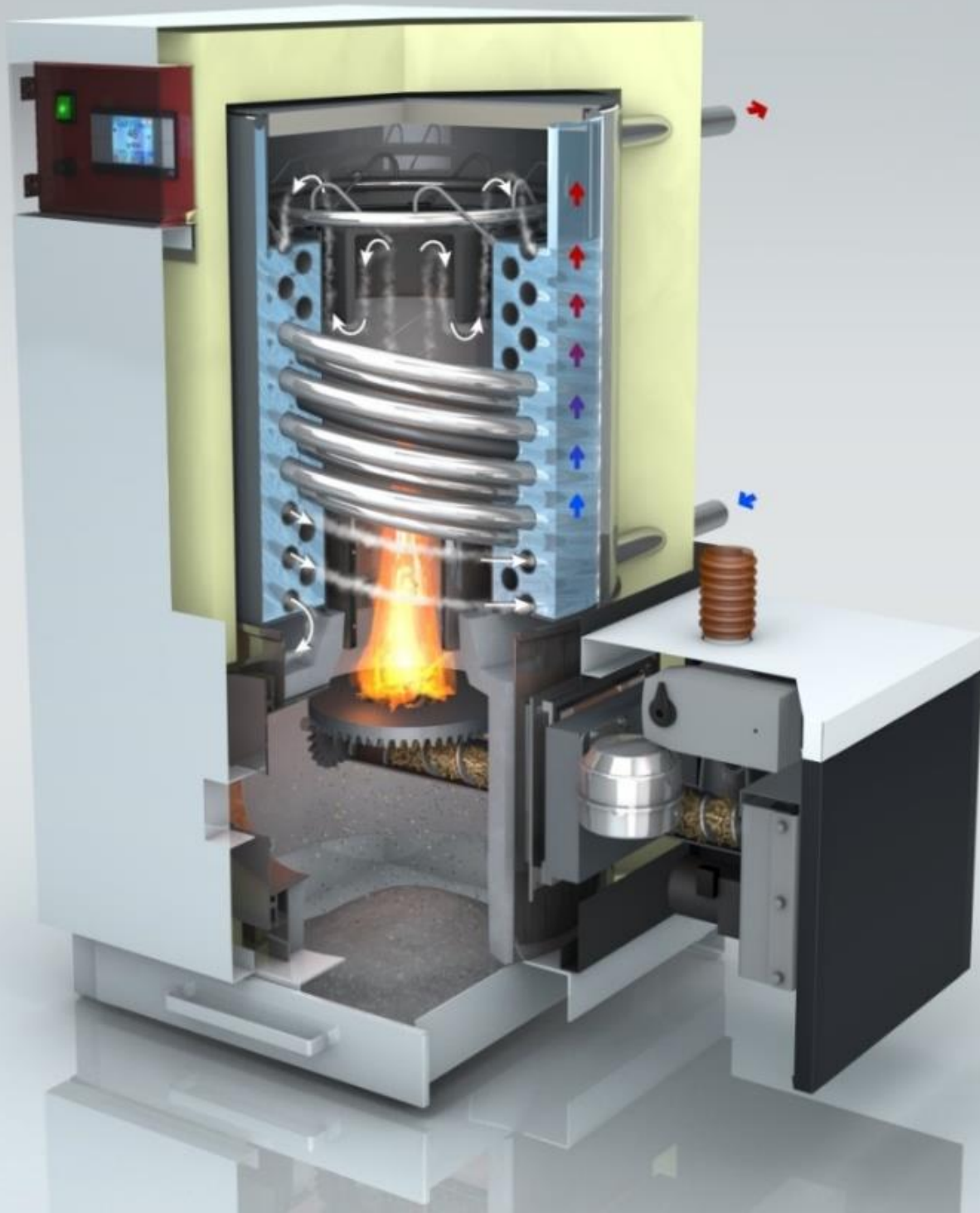
Collaborating with the companies

Objectives

Provide a Platform as a Service (PaaS) solution for simulation software provider companies and their clients in manufacturing and engineering.

- Use cloud HPC for running simulation and for automated analysis
- New licensing models via cloud
- Creating templates for large groups of similar SMEs





CFD simulation in the cloud

- Introduction of computational fluid dynamics (CFD) tools, integrated in a cloud environment, in the design cycle for the condensing biomass boilers of Biocurve.
- CloudFlow application contributed to reduce the time (and costs) to bring a new boiler to the market. Thus, the time-to-market for a new boiler can be reduced from currently 1 year to 8 months (a time reduction of 33 percent).



An optimisation application for steel cutting industries in HPC

The cutting machines can work with many pieces and different positions at the same time

The objective is to make the process as efficient as possible and to minimise the quantity of waste.



FORTISSIMO



NABLA DOT::()
INGENIERÍA COMPUTACIONAL DE FLUIDOS

Optimisation of wind turbines siting in urban areas

Application which couples GIS (Geographic Information System), NWP (Numerical Weather Prediction), CFD (Computational Fluid Dynamics) and analytics software in a cloud environment

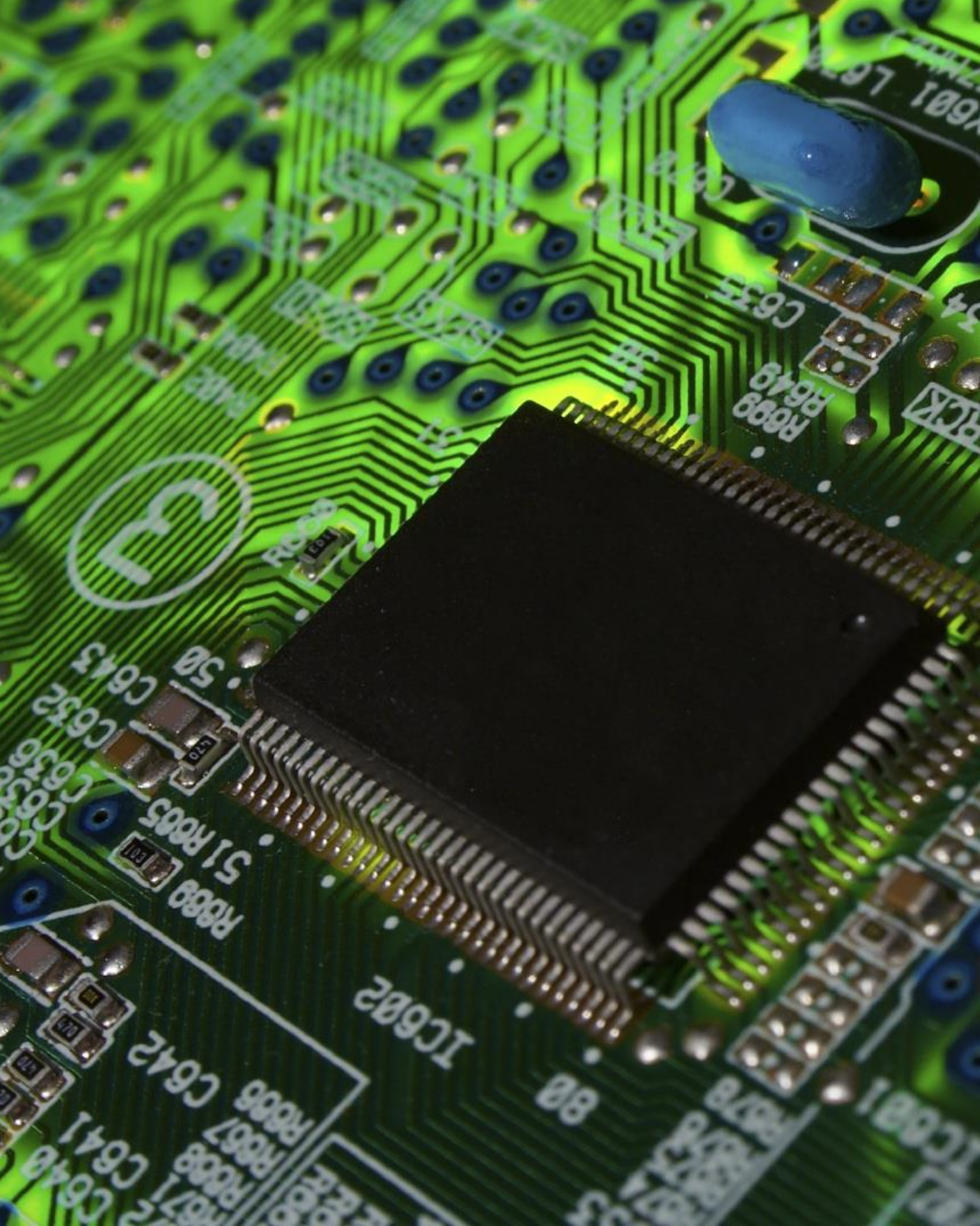
Provides detailed information of the wind flow in urban environments for small wind turbines (SWT)



Expert system to analyse the probability and severity of incidents on the electricity grid

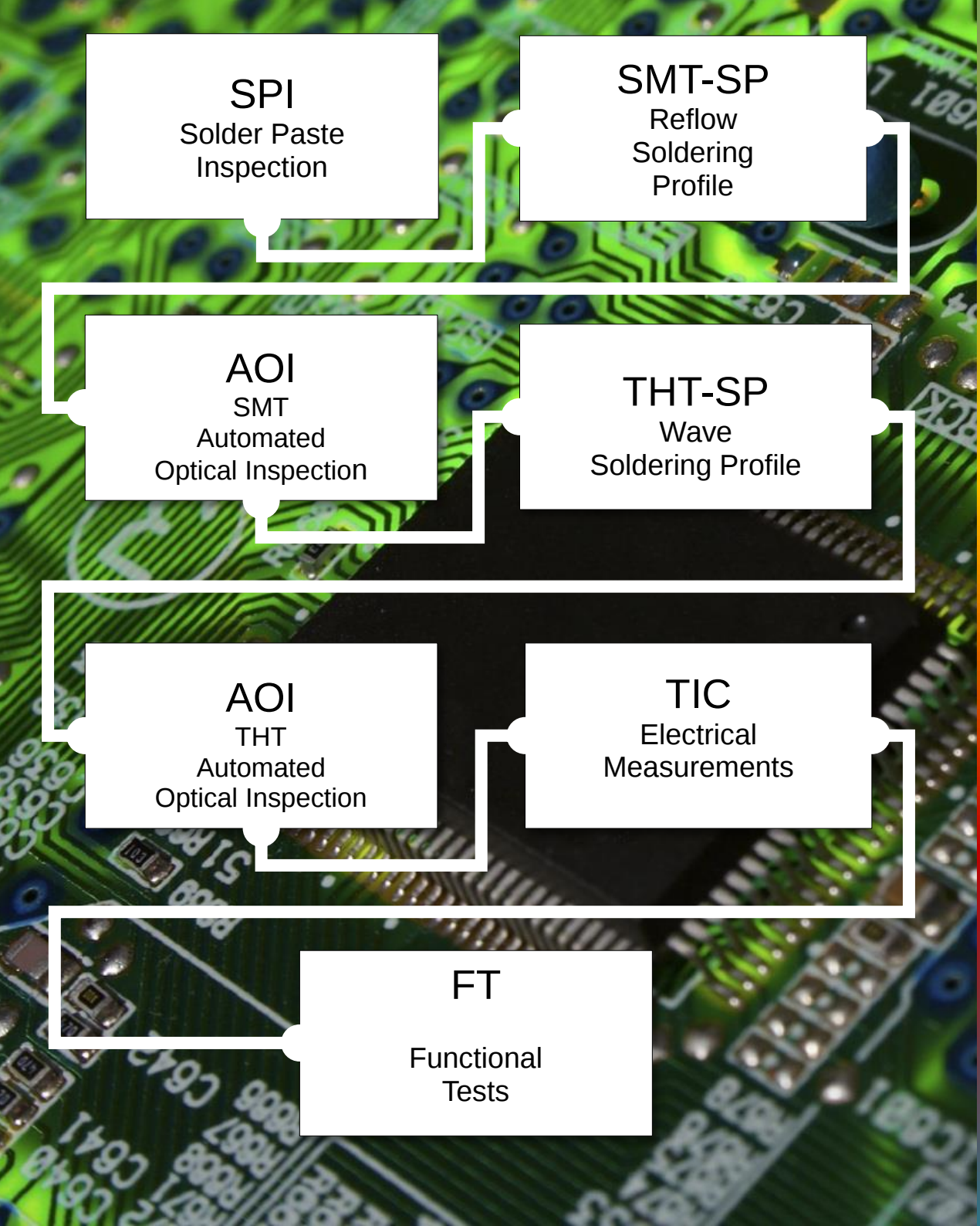
Probability of incidents depends on several factors, such as meteorology, grid load, age of materials, etc.

Market and social impact



SMART TEST

- Intelligent data mining model for an early detection of possible failures during the manufacturing process of electronic boards
- Improvement of the testing process, producing operative benefits in
 - Production process
 - Quality costs
 - Environmental impact

A diagram showing the manufacturing inspection process for electronic boards. It features a background image of a green printed circuit board (PCB) with various components and traces. Overlaid on this are several white rectangular boxes with black text, connected by white lines. The boxes are arranged in a staggered, overlapping fashion, representing different stages of inspection. The text in the boxes includes: 'SPI Solder Paste Inspection', 'SMT-SP Reflow Soldering Profile', 'AOI SMT Automated Optical Inspection', 'THT-SP Wave Soldering Profile', 'AOI THT Automated Optical Inspection', 'TIC Electrical Measurements', and 'FT Functional Tests'.

SPI
Solder Paste
Inspection

SMT-SP
Reflow
Soldering
Profile

AOI
SMT
Automated
Optical Inspection

THT-SP
Wave
Soldering Profile

AOI
THT
Automated
Optical Inspection

TIC
Electrical
Measurements

FT
Functional
Tests

- During the manufacturing process of the electronic boards, processes are controlled by sensor measurements and sophisticated image recognition inspections
 - Solder paste volume
 - Solder oven temperatures
 - Optical inspection measurements – Comparative histograms
 - Electrical measures: resistance, capacity, inductance, power
- Data are collected from the different manufacturing stages and stored for real time monitoring and further analysis



codeoscopic

Big Data models for the insurance sector

Better prediction of the accident rates based on external data:

- Demographic characteristics
- Historical traffic accidents
- Weather conditions
- Regional infrastructures

Prices better adapted to the customer needs

The screenshot displays a mobile application interface for comparing insurance policies. It features two rows of five insurance cards each. Each card includes the insurer's logo, the premium amount, a brief description of coverage, a star rating, and a 'Preemitir' (Preview) button. The cards are set against a blue background.

Insurer	Premium (€)	Coverage Description	Rating (Stars)	Includes ARAG
Reale	276,69	Con lunas, robo e incendio	4.5	Yes
Generali	324,06	Con lunas, robo e incendio, Se incluye indemnización por h...	4.5	Yes
PlusUltra Seguros	357,18	ESSENTIAL EXECUTIVE TERCEROS CON ROBO, LUNAS E INCENDIO	4.5	Yes
mussap	363,06	Con lunas, robo e incendio	4.5	Yes
Caser	388,50	RESPONSABILIDAD CIVIL, DEFENSA JURIDICA, ACCIDENT...	4.5	Yes
ZURICH	440,10	+ LUNAS + ROBO + INCENDIO	4.5	Yes
Caser	444,12	RESPONSABILIDAD CIVIL, DEFENSA JURIDICA, ACCIDENT...	4.5	Yes
Allianz	456,34	Con lunas, robo e incendio, excelente cobertura al conduc...	4.5	Yes
pelayo	480,38	Con lunas, robo e incendio; Buena cobertura de accide...	4.5	Yes
pelayo	499,73	Con lunas, robo e incendio; Buena cobertura de accide...	4.5	Yes



Thank you

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