

Performance, resilience, agility
improvement for goods and
services production systems



www.disp-lab.fr



SCIENTIFIC GOAL

Improve the performance, the resilience, the agility of goods and services production systems and comprehensive supply chains, by simultaneously addressing their structural, decision-making, information-related and human-related dimensions.

DOUBLE EXPERTISE

Industrial engineering • Computer Science

KEY FIGURES

30 lecturers and researchers

27 PhD students

4 technico-administrative staff

15 invited researchers and interns
every year

Two scientific axes

OPERATIONS MANAGEMENT & OPTIMISATION

Organise, control and improve the performance of goods and services production systems and supply chains in dynamic and uncertain environment.

INFORMATION SYSTEMS & DATA

Characterise, formalise and implement the enterprises digital transformation by the evolution of information systems with a lifecycle vision of data, products / services and complex systems.

Three main applicative domains

INDUSTRIAL SYSTEMS



APR, Catidom, EDF, EnergyPool,
Fortal, PIL/Deschamps, Rossignol,
Renault, Saverglass, Tardy,
Valhrona, Volvo (chaire)

HEALTHCARE SYSTEMS



ARS Rhône-Alpes, CHU St Etienne,
CHU Grenoble, Croix Rouge, HAD
63, HCL, Hôpital St Joseph-St Luc,
LINDE, OVE, Soins et Santé

SERVICE



Agilium, Audros Technology, Berger
Levrault, Carl, Courbon, Infologic, KLS,
One Point, Processway, Quasar, SAP,
Users SAP France, Sciado

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OPERATIONS MANAGEMENT & OPTIMISATION

Organise, control and improve the performance of goods and services production systems and supply chains in dynamic and uncertain environment.



Our expertise

RESOLUTION OF PLANNING AND SCHEDULING PROBLEM

- Optimisation, simulation and control of production operations
- Configuration of production lines
- Taking into account uncertainties
- Proposition of robust & stable solutions
- Taking into account economic, social, societal and environmental impacts

PROPOSITION OF DECISION-HELPING TOOLS ADAPTED AND DEDICATED TO CRISIS SITUATIONS

- Taking into account uncertainties in the decision process
- Proposition of flexible and resilient solutions
- Integration of the system real-time dynamics
- Proposition of predictive scenarios
- Treatment of large amount of data (Data Mining, Big Data, Digital Twin)

RESOLUTION OF LOGISTICS, SUPPLY CHAIN, TRANSPORT AND VEHICLE TOURS PROBLEMS

- Combination of machine learning and heuristics, hybridisation of centralised and distributed models
- Integration of constraints linked to products / patients
- Proposition of the most robust and stable solutions
- Integration of cooperation / collaboration of stakeholders
- Treatment of short-circuit and circular economy problems
- Integration of structural, decision, information et human dimensions

Our software tools

Ilog IBM Cplex, Gurobi Optimization,
Mathematica Professional
AnyLogic, FlexSim, Arena
suite Anaconda3 (Python), Matlab
ERP (SAP ECC, SAP S/4 HANA), Ortems,
Incoplan
Ecoinvent, OpenLCA, GABi

Axis leaders



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APPROACHES & METHODS

- Combinatory optimisation and operational research (Integer programming, metaheuristique, constraint-based, discrete optimization via continuous relaxation
- Discrete-events simulation, agent-based simulation
- Business Process Modelling, Life-Cycle Analysis
- Complex networks, topology, geometry, game theory, fuzzy logic
- Artificial Intelligence (clustering, machine learning)
- Multi-criteria, multi-objective decision helping
- Research-action : observation, case study, interview

INFORMATION SYSTEMS AND DATA

Characterise, formalise and implement the enterprises digital transformation by the evolution of information systems with a lifecycle vision of data, products / services and complex systems.



Our expertise

DIGITAL TRANSFORMATION OF ENTERPRISES

Digital Twins approach, IoT, CPS, distributed decision helping

- Production zero default / "**reliable production the first time**", maintenance, product quality
- Flow modelling to analyse transformation capabilities
- IoT Integration / exploitation to compensate flow discontinuities
- Engineering of systems & Cyber-Physical Systems for production
- Simulation, distributed decision taking
- Business process maturity and resilience models

INFORMATION SYSTEMS TRANSFORMATION

Mutation, interoperability, reuse of software components, micro-servicisation, semantic enrichment

- Knowledge extraction and formalisation (Ontologies, Graphs)
- Modelling, transformation and enrichment of models
- Agent-based modelling and simulation,
- Data sciences and techniques of Artificial intelligence
- Detection and qualification of software capabilities
- Procurement of software components
- Agile transformation of IS processes

SMART AND ECO-RESPONSIBLE PRODUCT / SYSTEM LIFECYCLE MANAGEMENT IN A CIRCULAR ECONOMY APPROACH

- Lifecycle modelling of data and products in a IoT and CPS context
- Knowledge management and data analysis: semantic Web, artificial intelligence and automatic learning, archiving and reuse, traceability, etc.
- Product lifecycle analysis, evaluation of product lifecycle sustainability
- Maturity evaluation and improvement of systems and products

Our software tools

Oracle BPM/SOA, WSO2, ARIS
ERP (SAP ECC, SAP S/4 HANA), MES
(PcVue), PLM (ARAS, 3DExpérience), IoT
(Thingworx)
Ecoinvent, OpenLCA, GABi
AnyLogic, suite Anaconda3 (Python),
Matlab, ElasticSearch

Axis leaders



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APPROACHES & METHODS

- Data and business process Modelling, System Engineering, LCA
- PLM, ontology, MDA-MDE, SOA, interoperability,
- System Re-engineering, micro-servicisation, Software Product Line, feature-model
- Agent-based approach, Artificial Intelligence (clustering, machine learning), fuzzy logic
- Knowledge extraction, structuration, reuse

PARTNERSHIP OPTIONS

Do you need an expert to support you in continuous improvement or breakthrough projects ?

Different partnership options are available depending on your specific needs.



THE LABORATORY
INSTITUTIONS ARE
ACCREDITED FOR « CRÉDIT
D'IMPÔT



INTERNSHIP WITH RESEARCH



Duration : about 6 months

Conditions : full-time internship + accompanying contract

Research mission for a M2 or engineering student finishing his/her studies, supervised by a lecturer and researcher specialist in the topic .

EXPERTISE CONVENTION

Duration : of your choice



Modalité : consultancy contract

A lecturer and researcher, specialist in the topic of interest, support you in setting up a custom solution to your problem.

RESEARCH CONTRACT

Duration : possibility for short-term,



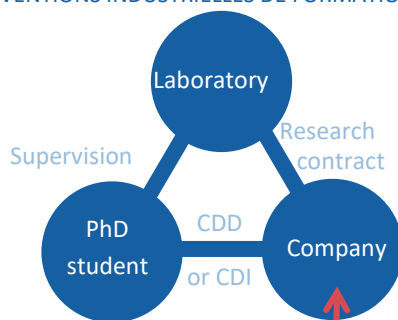
medium or long-term contracts

Conditions : Private law contract written in accordance with your specific needs: new concept, tools, demonstrator, prototypes, patents...

CIFRE PHD (CONVENTIONS INDUSTRIELLES DE FORMATION PAR LA RECHERCHE)

Duration : 3 years

Conditions :



ANRT subsidy: 14 000€/year over 3 years (figures from 2015)

A young researcher in doctoral training works in your company and in the laboratory to solve an applied research problem.

FRAMEWORK AGREEMENT



Premium partnership on a specific research axis, defined in the long term with a framework agreement

COLLABORATIVE RESEARCH PROJECT

Duration : 1 to 5 years

Conditions : multiparty project that can bring together several laboratories and companies.

Possible fundings : ADEME, FUI, ANR, Europe... Together, we look for the appropriate funding.

Exploring a research topic on a medium/long term, involving several companies and led by a research team that can gather several research centers in several countries.



INDUSTRIAL CHAIR



Long-term collaboration, in research and/or teaching, on a highly strategic, high priority issue.

A word cloud centered around the terms "Information System" and "Business". The words are arranged in a circular pattern, with "Information System" and "Business" being the largest and most prominent. Other words include "Architecture development", "Lifecycle", "Standardization", "Interoperability", "Information", "Simulation", "Operations management", "Coordination", "Performance", "Organization", "Développement", "Planning", "Game theory", "Production", "Goods Services", "Knowledge", "Modelling", "Mathematical", "Product data", "Operations research", "Flow management", and "Scheduling". The words are color-coded: blue for "Information System", orange for "Business", red for "Optimization", green for "Standardization", "Interoperability", "Simulation", "Planning", "Game theory", "Production", "Goods Services", "Knowledge", "Operations research", "Product data", "Flow management", and "Scheduling", and yellow for "Coordination", "Performance", "Organization", "Développement", and "Modelling".

Information System

Architecture development

Lifecycle

Standardization

Interoperability

Information

Simulation

Operations management

Coordination

Performance

Organization

Développement

Planning

Game theory

Production

Goods Services

Knowledge

Modelling

Mathematical

Product data

Operations research

Flow management

Scheduling

Optimization

SUPERVISING INSTITUTIONS



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