

LocalSolver

www.localsolver.com

LocalSolver

Your global optimization partner



Your global optimization partner

Easy modeling

Best-in-class support

Fast solutions

Custom solutions & services

Highly scalable

Flexible licensing & pricing

« Efficiency, responsiveness, and professionalism
are values that LocalSolver truly cultivates »

JCDecaux



General-purpose optimization engine

LocalSolver Global Optimization Solver

Combinatorial
Optimization

Nonlinear
Optimization

Mixed-Variable
Optimization

Simulation
Optimization

Maintenance & Support

Help to model & solve your problems, New versions, Corrective patches, License migration

New-generation, global optimization solver
based on innovative proprietary algorithms



Solutions & services

LocalSolver Global Optimization Solver

Vehicle
Routing

Supply Chain
Management

Telco Network
Design

Workforce
Management

Production
Scheduling

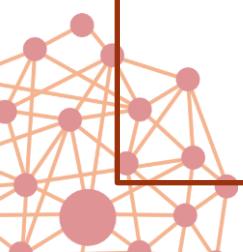
Warehouse
Management

Media Planning
& Pricing

Banking
Solutions

Services

Consulting, Prototyping, Development, Integration, Maintenance, Support



150 companies, 1,000 users, 25 countries



DENSO



THALES



SONY



SITA

HITACHI



FUJITSU

Beiersdorf



TFI



GROUPE RENAULT



SIEMENS

Deutsche Post DHL Group

Pasco



AMADEUS

Testimonials

“Outstanding solutions in just a few minutes of running times despite the gigantic number of variables”

“What we appreciate most is the incomparable ease of modeling provided by the LocalSolver mathematical formalism”

“We've been using LocalSolver at Airbus since 2014 to solve assignment and very large, nonlinear problems that the traditional MIP solvers were unable to solve.”

“The innovating features of LocalSolver and its unique modeling formalism have allowed us to solve numerous problems on which we could not find satisfying solutions with MIP solvers.”

Pasco

**GROUPE
RENAULT**

AIRBUS

**Newton.
Vaureal
Consulting**



Testimonials

“The world's best performing optimization engine to solve highly combinatorial and nonlinear problems”

“The new solution, based on LocalSolver, is more generic, more scalable, easier to maintain, but also much fastest, with just a few seconds of running time to get optimal solutions.”

“LocalSolver has proven instrumental for finding high-quality solutions within minutes to satisfy the needs for dynamic re-planning.”

“Technically brilliant product and excellent level of support”



Testimonials

“The dream of global optimization comes true”

“LocalSolver is a great engine. We are very glad about the results, even for large size problems!”

“True added value and innovative technology.”

“I have never seen anything approaching from any other solver vendor.”



YDUQS



LocalSolver

Easy, fast & scalable optimization



Unique features & technicalities

Easier, faster, scalable

- Easier: nonlinear and set functions to model your problems
- Fast: solutions in minutes or even in seconds
- Scalable: solutions to million-variable problems

Under the hood

- Simplex, Interior-Point, Augmented Lagrangian methods
- Black-box, derivative-free, surrogate modeling methods
- Branch-and-bound, cutting planes, interval methods
- Inference, propagation, clause learning
- Primal heuristics, large neighborhood search
- Metaheuristics, matheuristics
- Multiobjective optimization
- Statistical learning techniques for autotuning



Feature comparison

	LocalSolver	Gurobi	Cplex
Continuous variables	+	+	+
Discrete variables	+	+	+
Set variables	+		
Linear expressions	+	+	+
Quadratic expressions	+	+	~
Nonlinear expressions	+	~	
Set expressions	+		
External functions	+		
Surrogate modeling	+		
Multi-objectives	+	~	
Dedicated support	+++	+	
New versions	every 6 months	every 12 months	every 24 months
Flexible pricing	+++	+	
Custom services	+++		



How to use it

LocalSolver Programming language (LSP)

- Lightweight modeling language for fast prototyping with LocalSolver
- Available as a plugin of Microsoft Visual Studio Code
- APIs to parse input data in plain, CSV, or JSON files
- APIs to integrate your LSP model in Python, Java, C#, C++ applications

LocalSolver APIs

- High-level, object-oriented
- Easy modeling thanks to the overloading of math operators (+ – * / % && || != ...)
- Python, Java, C#, C++ APIs for tight integration in applications

Supported platforms

- Available for x64 architecture on Windows, Linux, macOS platforms
- APIs to transparently run your LocalSolver model in the cloud (coming soon)



LocalSolver

Benchmarks

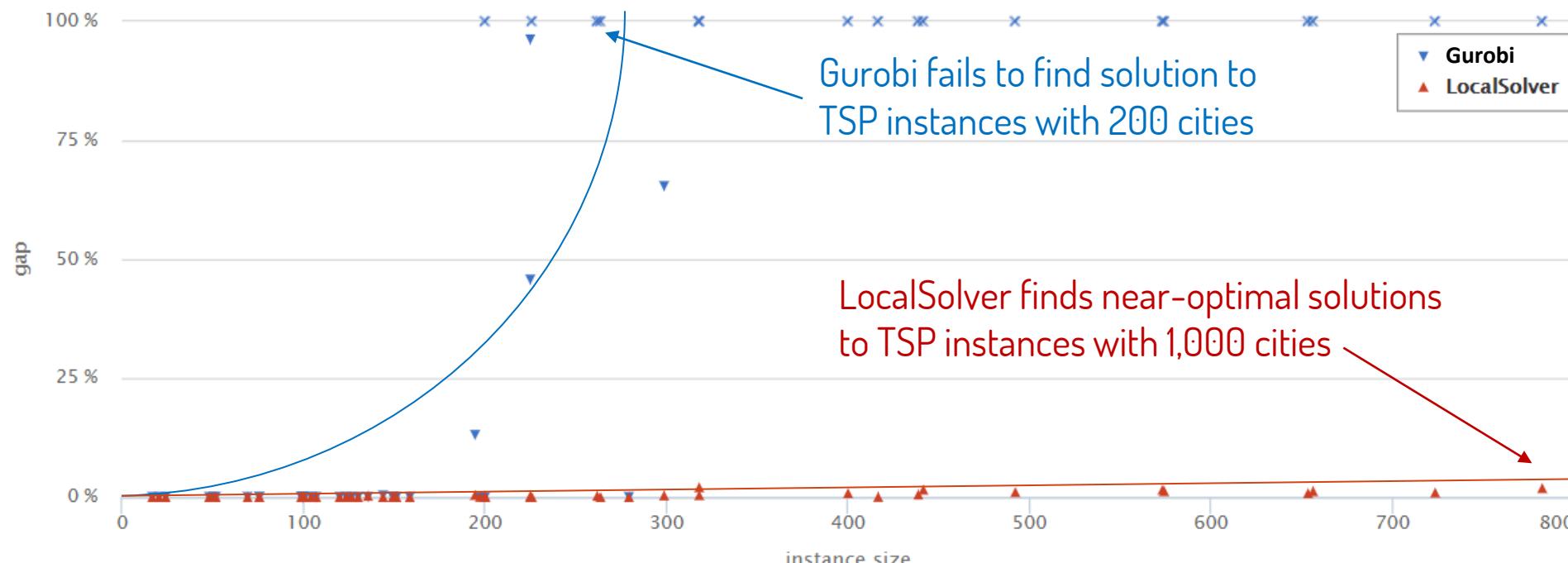


Traveling salesman

Find the shortest tour that visits all cities once

1 minute

- Instances from TSPLIB, 1 minute of time limit
- Benchmark against Gurobi, proclaimed “the world’s fastest solver”
- Cplex and Xpress not displayed because worst than Gurobi

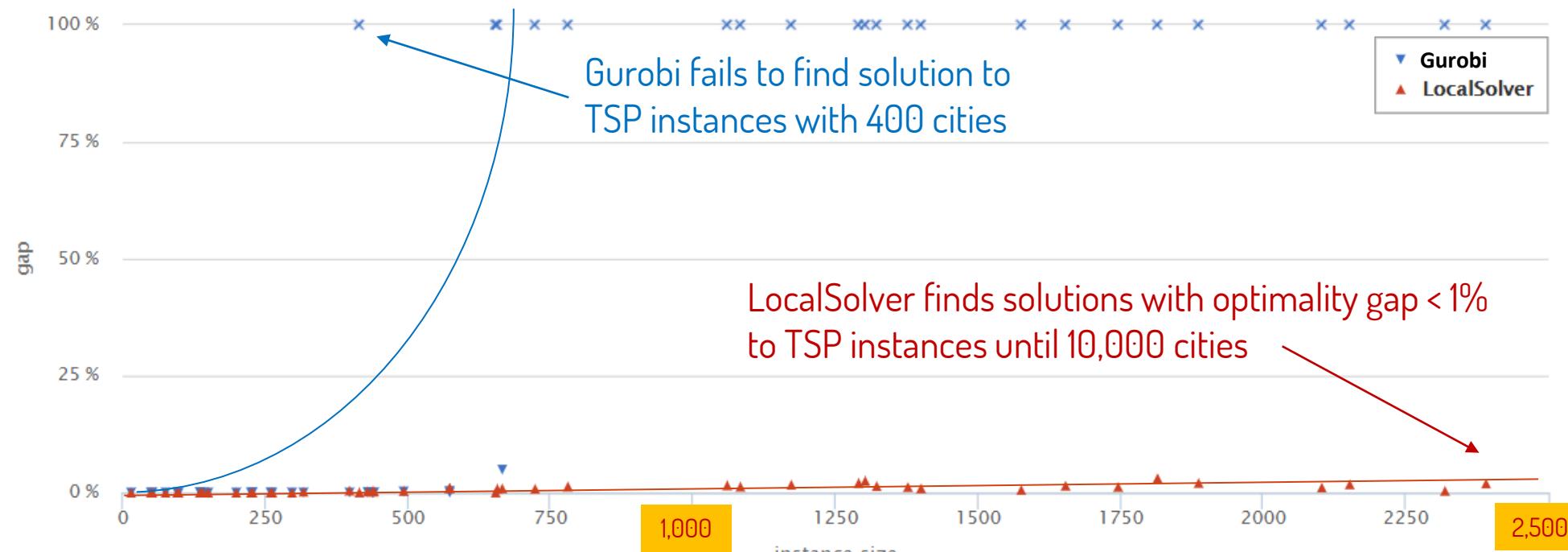


Traveling salesman

Find the shortest tour that visits all cities once

1 hour

- Instances from TSPLIB, 1 hour of time limit
- Benchmark against Gurobi, proclaimed “the world’s fastest solver”
- Cplex and Xpress not displayed because worst than Gurobi



<https://www.localsolver.com/benchmarktsp.html>

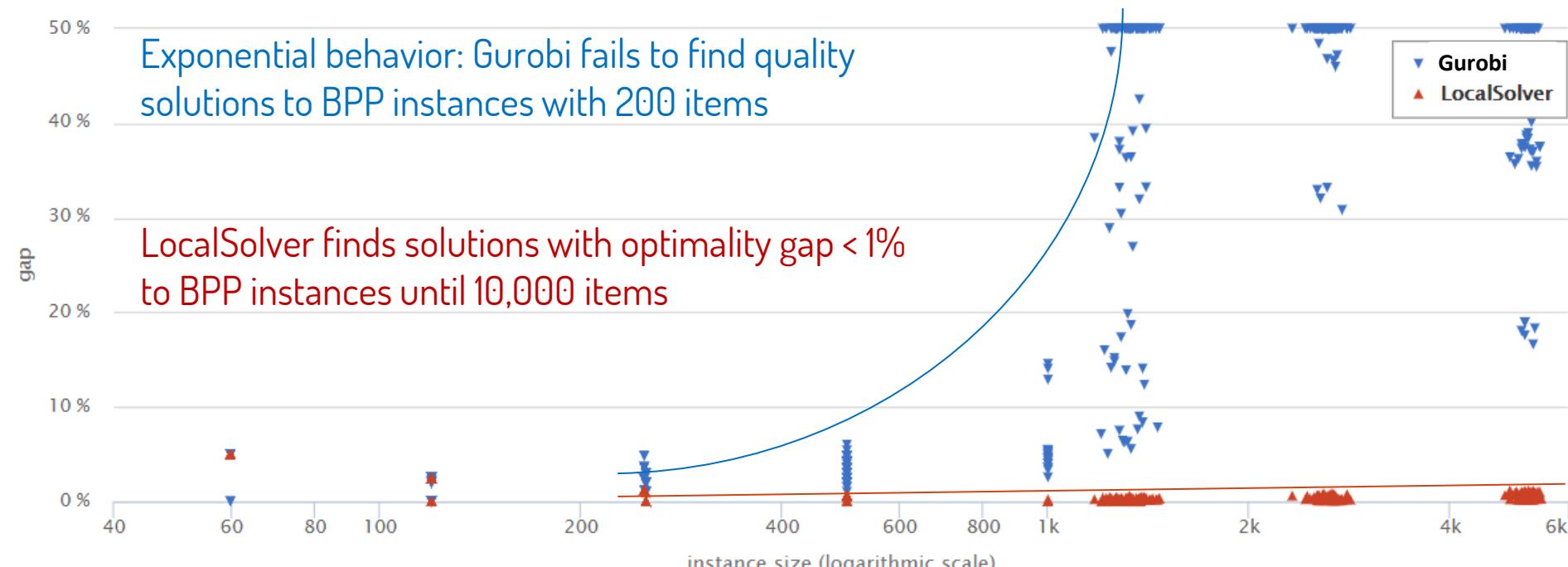


Bin packing

Pack items into bins

1 minute

- Instances coming from BPPLIB
- Time limit: 1 minute
- Benchmark against Gurobi



<https://www.localsolver.com/benchmarkbpp.html>

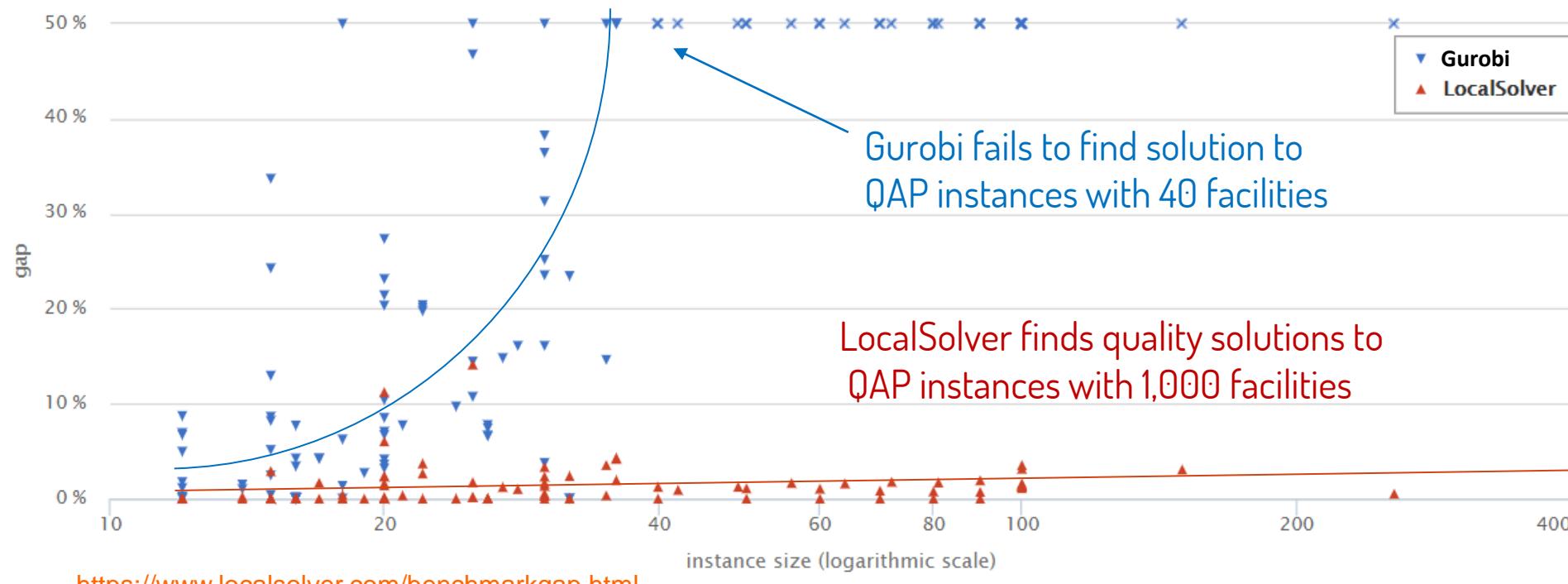


Quadratic assignment

Assign facilities to locations with quadratic costs

1 minute

- Instances coming from QAPLIB
- Time limit: 1 minute
- Benchmark against Gurobi MIQP solver



Production scheduling

Car sequencing

- Smoothing car production loads along the assembly line
- OR challenge posed by Renault <http://challenge.roadef.org/2005/en>
- Up to 1,300 vehicles to sequence → 400,000 boolean variables

**GROUPE
RENAULT**

Benchmark on the smallest instance of the challenge

- 500 vehicles to sequence
- 40,000 boolean variables once modeled
- State-of-the-art solution cost: **3,109**
- Gurobi **3,027,000** in 10 min **194,161** in 1 hour
- LocalSolver **3,476** in 10 sec **3,114** in 10 min

**Minimization
Lower is better**



LocalSolver

Supply chain network design



Pasco

FUTURE^e
Architect

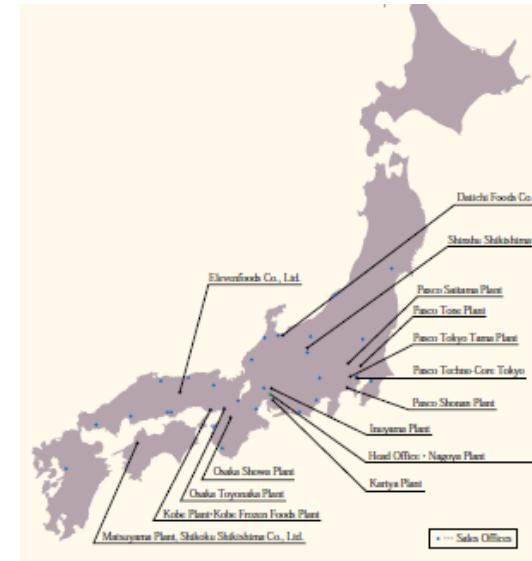


☞ Global supply chain network optimization

1,000 products, 900,000 orders to produce each day
100 supply sites, 13 production sites, 26 delivery sites

32 million variables, including 8 million binaries

Gurobi, Cplex, Xpress fail to find solutions in hours
Solutions in minutes using LocalSolver, no tuning
Used in production at Pasco since 2015

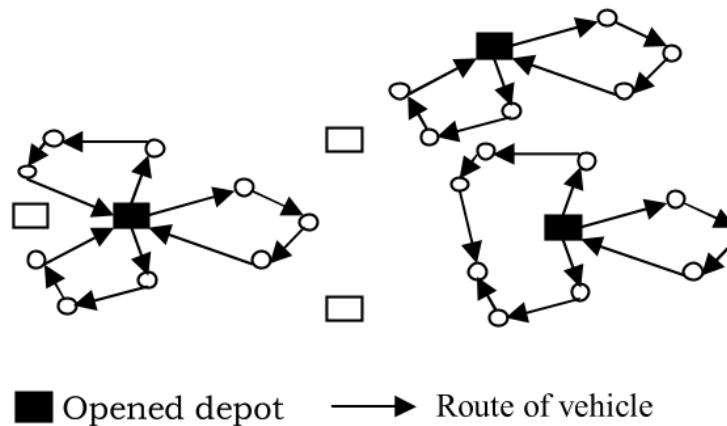


Pascoの
バラエティ
ブレッド





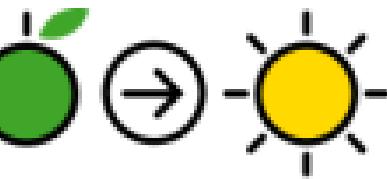
Starbucks North America hub network optimization = Location Routing Problem (LRP)



Benchmark won against Gurobi in 2017

- Huge problem: 20,000 stores to deliver from 200 depots
- No solution in hours using Gurobi
- Easy modeling using innovative LocalSolver Python APIs
- Solutions in minutes using LocalSolver, no tuning
- \$M of annual savings





◀ **Frozen meal logistics network redesign optimization**

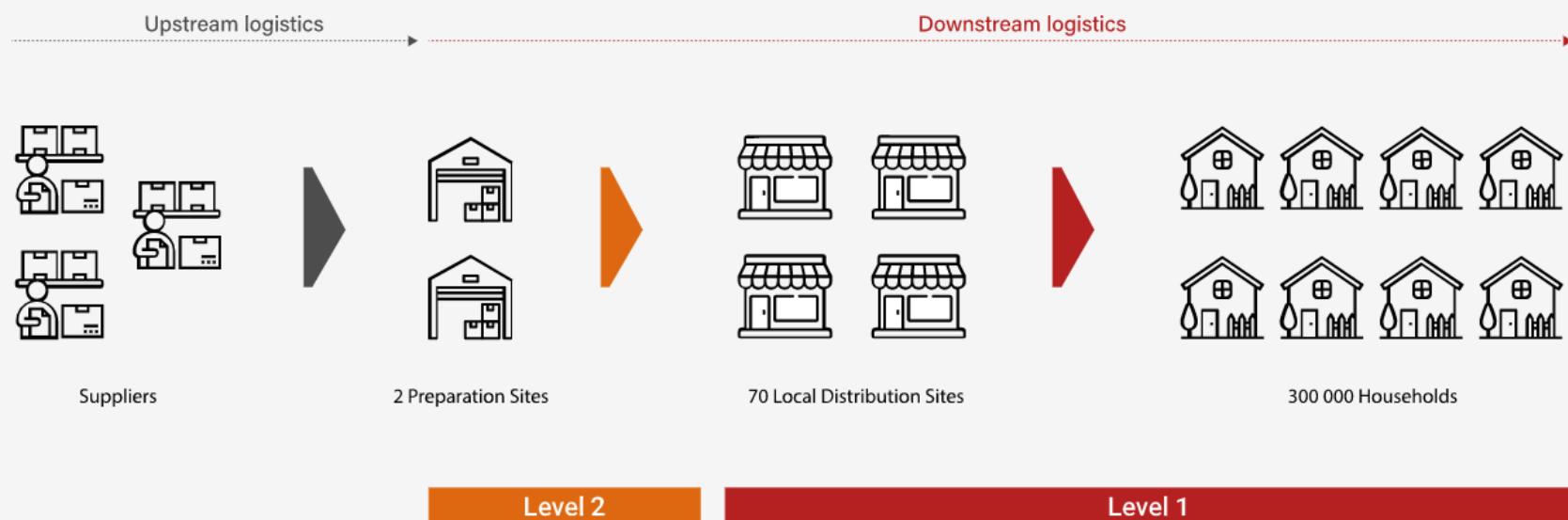
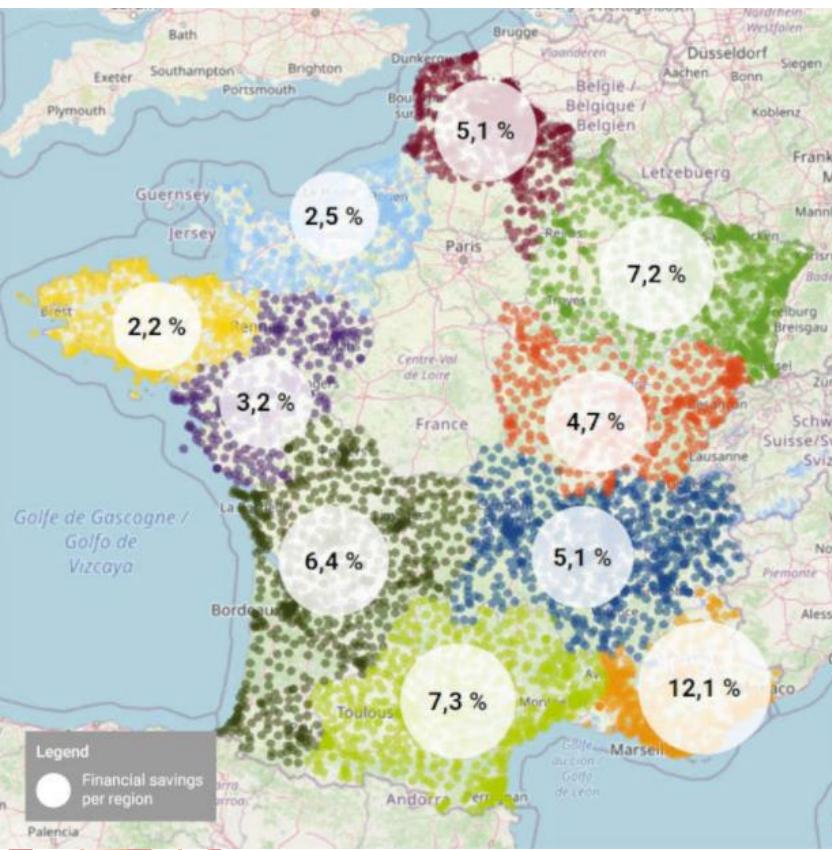
300,000 customers grouped into 3,700 geographical clusters

70 distribution sites + 250 locations for possible new sites

2 preparation sites + 250 locations for possible new sites

→ 1 million binary variables, solved in minutes

Benchmark won against Cplex in 2020





Used by supply chain optimization team in Brussels
to solve different optimization problems

Network design optimization in Europe
Benchmark won against Xpress in 2020



LocalSolver

Production scheduling



We use LocalSolver for several optimization problems including the scheduling of door manufacturing in car factories and the optimization of empty packaging return flows. What we appreciate most is the incomparable ease of modeling provided by LocalSolver formalism. Besides, exchanging with the LocalSolver team is always extremely fruitful and highly pleasant.

Alain Nguyen, Head of Operations Research, Renault

Scheduling of car door manufacturing under stock and sequencing constraints

☞ **Optimization of empty packaging return flows in the Renault network**

Switch from Cplex to LocalSolver in 2018



AIRBUS

Scheduling of the extruding shops at Nantes (fr)

Heterogenous parts and machines, buffers, cranes

500 jobs weekly rescheduled in minutes

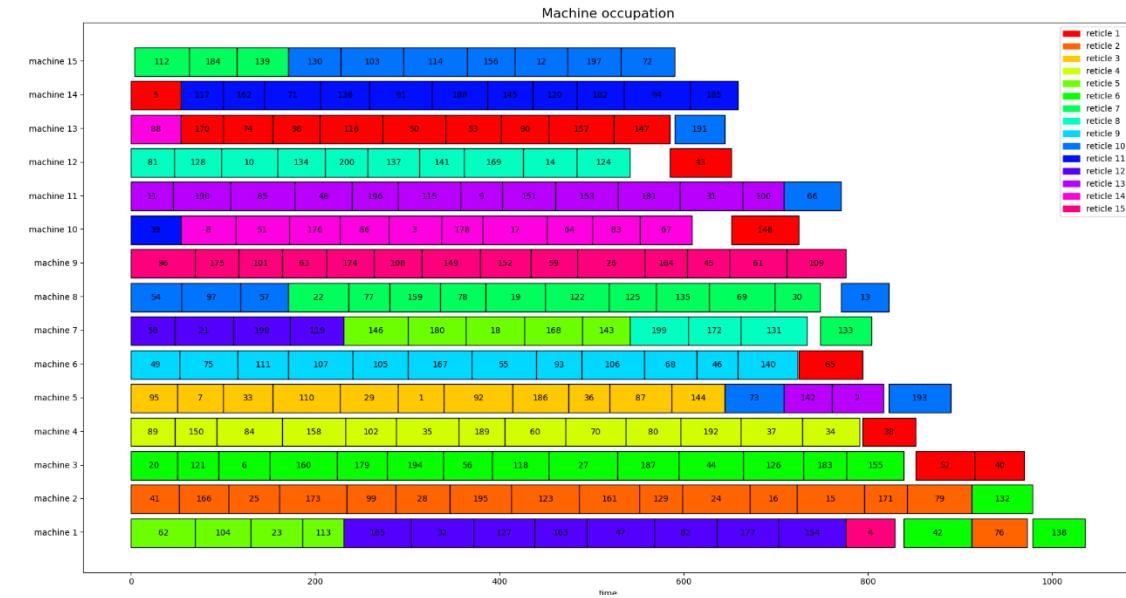
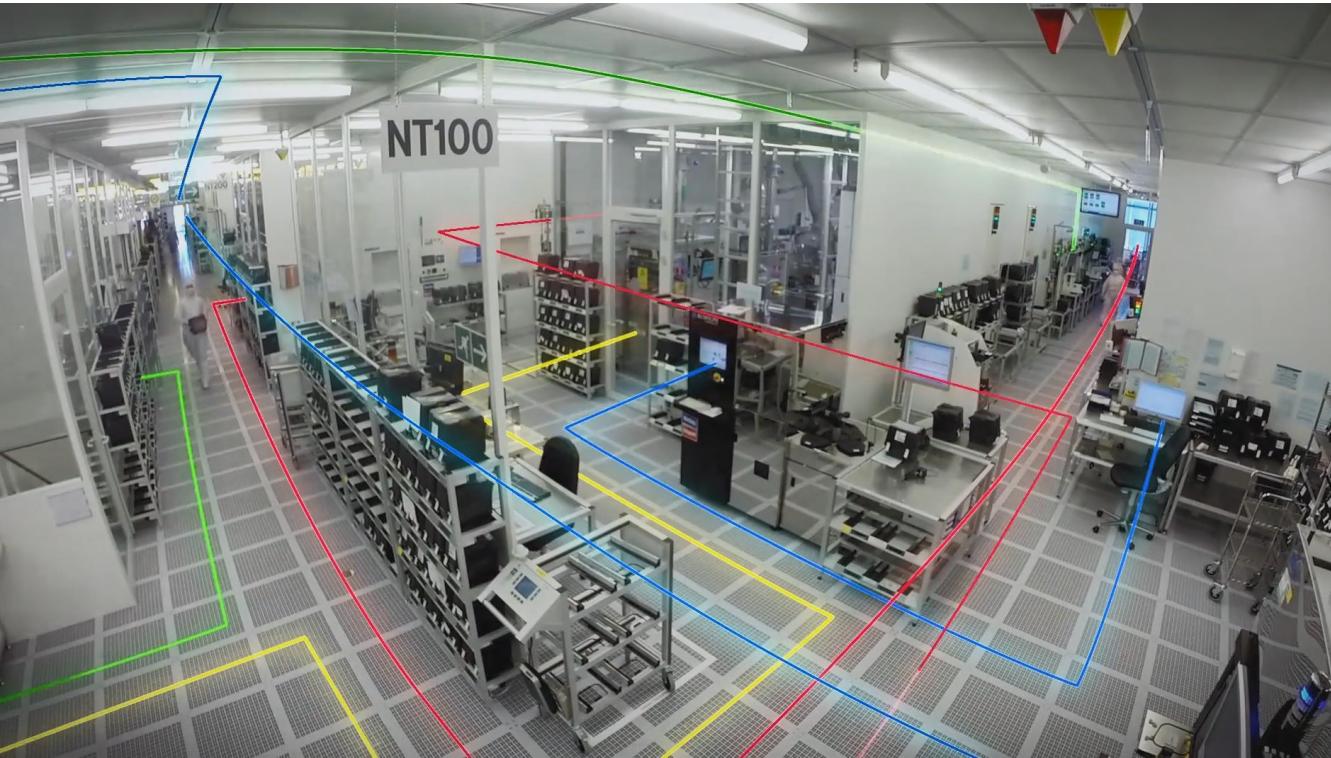
Benchmark won against Cplex and Gurobi in 2018





BOSCH

Production scheduling at Bosch WaferFab in Reutlingen (de)



Semiconductors, MEMS sensors
for automotive & consumer electronics

Benchmark won against Gurobi in 2017

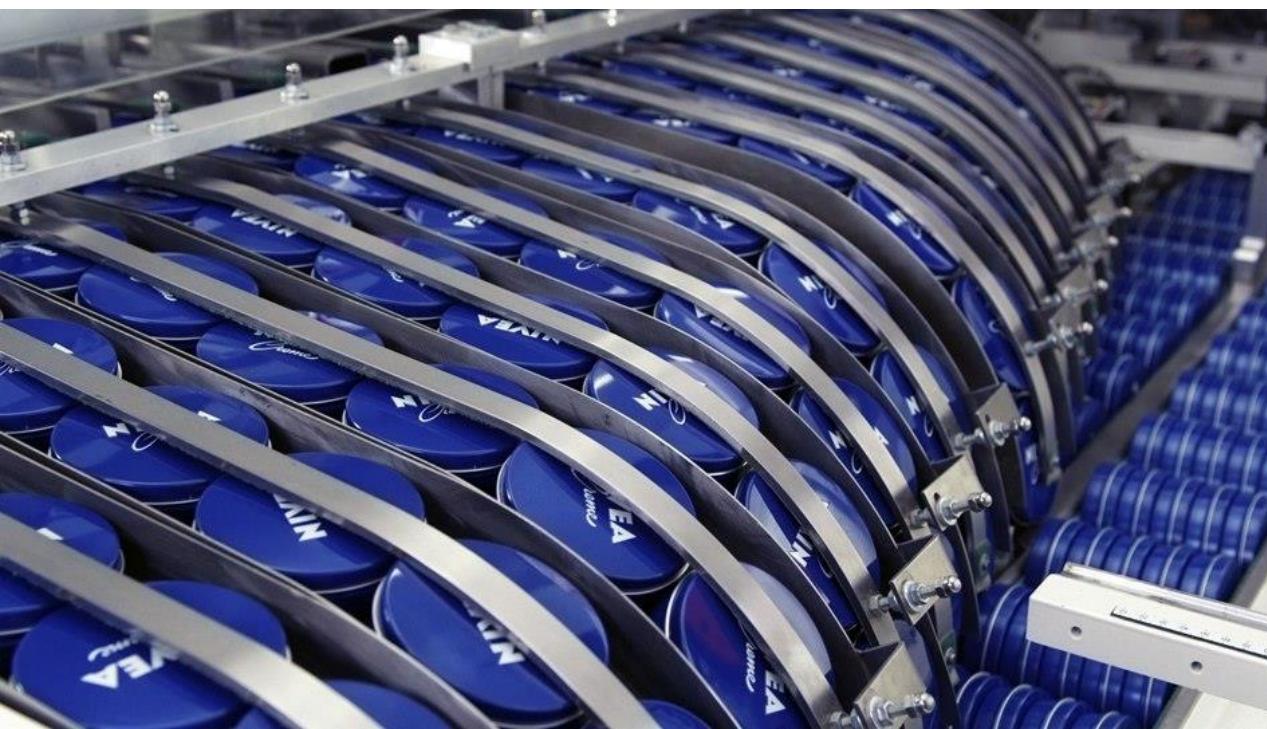
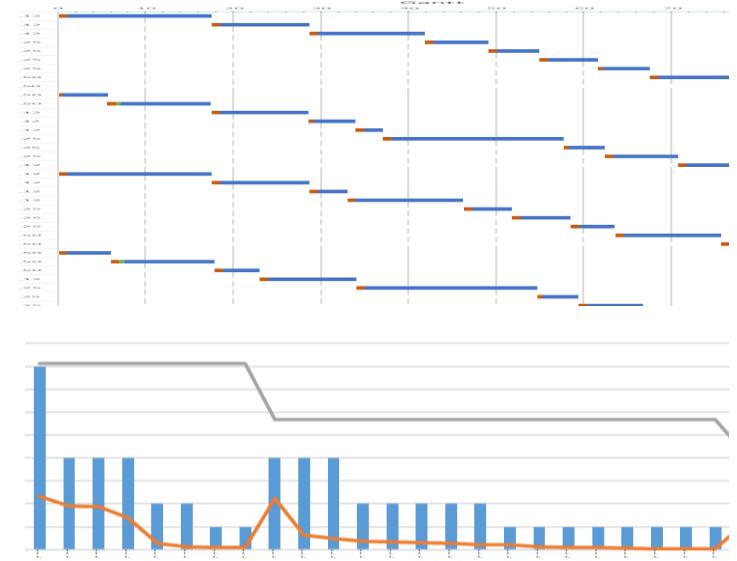
300 jobs daily scheduled on
20 machines in minutes

Beiersdorf

Mid-term planning of bottling lines: minimizing product and container changes under demand constraints

Benchmark won against Gurobi in 2018

Deployed in Europe and Asia since 2019





Scheduling aluminum casting orders in ovens
with various operating constraints and costs
(timings, capacities, precedences)

Benchmark won against Gurobi in 2018



【具体的には】

数理統計・情報システム技術等に関わる技術

使用ツール

- ◆Java/C#/Python等のプログラミング言語
- ◆R/SPSS等の統計分析ツール
- ◆QlikView等の可視化ツール
- ◆LocalSolver等の最適化ソルバ

JFE Steel since 2019



JFE

Steel Corporation



株式会社神戸製鉄所
KOBE STEEL, LTD.

KOBELCO

Kobelco since 2016

- Production scheduling
- Berth scheduling

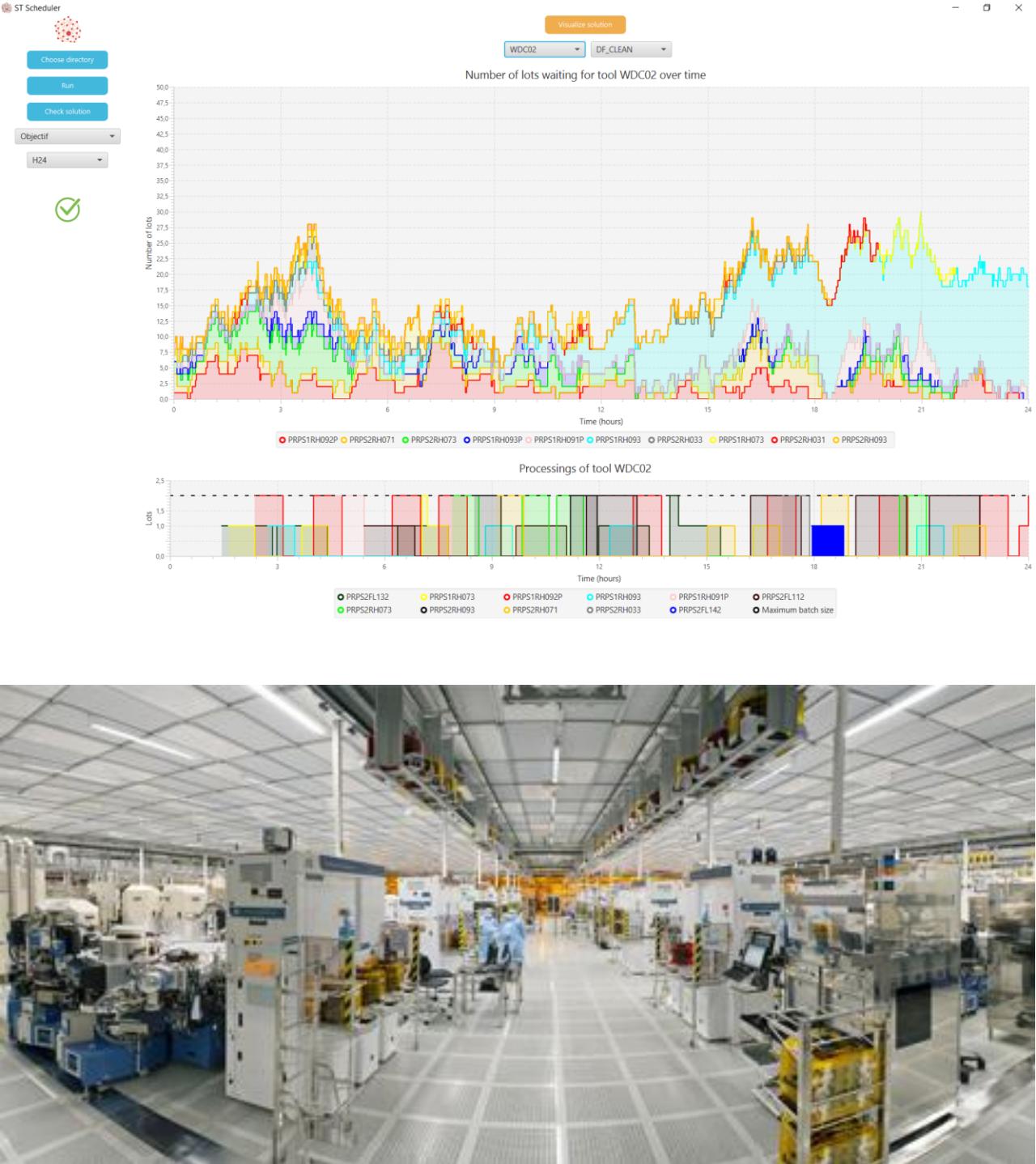
ZENTIVA

Generic drug production scheduling

Deployed on 3 production sites:
Ankleshwar (in), Bucharest (ro), Prague (cz)

Benchmark won in 2020





Production scheduling at
STMicroelectronics WaferFab
in Rousset (fr)

2,000 jobs on 70 machines
Near-optimal solutions in minutes
Benchmark won in 2020



Production scheduling at
Ouest-France printing press
in Rennes (fr)

Benchmark won in 2020



LocalSolver

Route optimization





Used in production since 2019
in US & Canada



Vehicle routing problem
with inventory management

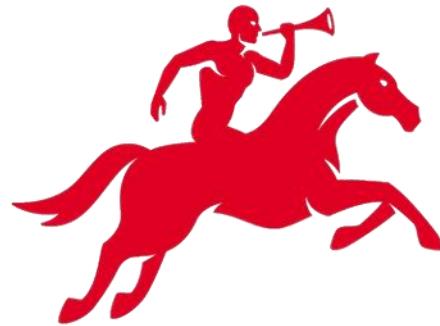
Benchmark won against
the best COTS in 2018

Highly complex route optimization

- Until 500 clients to serve
- Order & inventory management
- Heterogeneous resources (drivers, tractors, trailers) with time windows
- Sourcing and delivery time windows
- Multiple depots, multiple products
- Complex driver rules and regulations
- Near-optimal solutions in minutes



Route optimization of
recycling trucks in Finland
Complex constraints to manage
related to trailers and cranes



ctt

Portuguese Post (CTT): optimization of mail
and parcel transport in Lisbon (last-mile)

Deliveries by car or bicycle
+ walking loops (“flower petal” tours)



Deutsche Post DHL Group

German middle-mile network redesign
German last-mile route optimization
Dutch DHL middle-mile route optimization

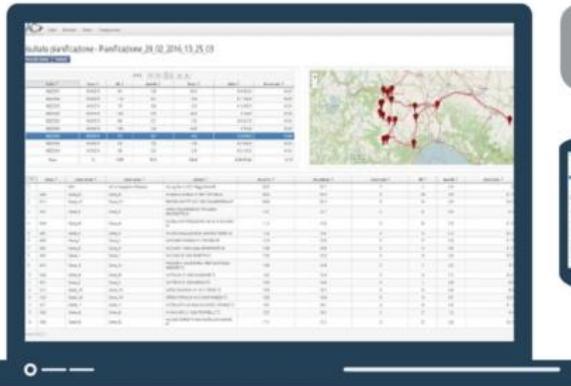




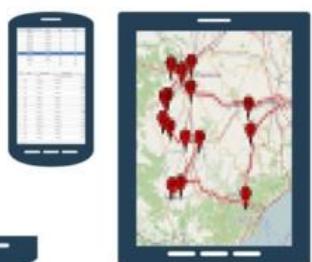
Gestione storico su DB
Web Application Multi Account
Mappe reali e aggiornate KPI
Report Automatici
Fatturazione e Bolle
Flotte miste, tempi di operazione
Capacità di carico e finestre temporali
Possibilità Geolog Real Time
Costi di trasporto e carburante

LocalSolver

Modello matematico personalizzato
Vincoli, obiettivi prestazionali ed economici specifici
del business del cliente



ERP (in/out) - OCR da PDF e documenti cartacei



Connessione database
Microsoft Office®
File, txt, csv...
Socket TCP/UDP

LAC

Last-mile delivery optimization for the Italian SME market





Leading German telematics
& fleet management SaaS provider
Logistic clustering, route optimization,
driver scheduling



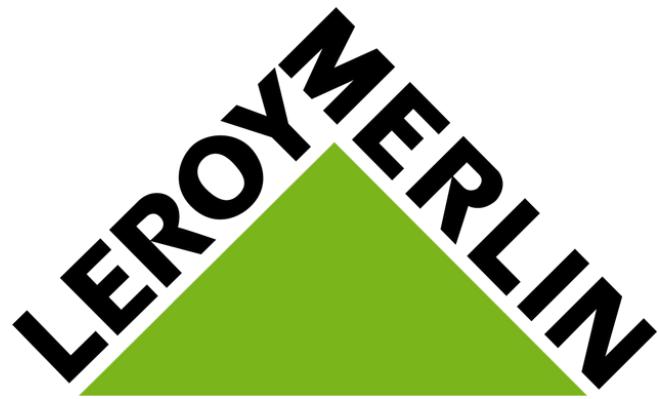
Leading French last-mile
delivery SaaS provider
Logistic clustering, route (re)optimization,
order (re)dispatching, pickup & delivery



LocalSolver

Warehouse management





Warehouse layout optimization based on flows
→ Quadratic assignment problem

Benchmark won against Cplex and Gurobi in 2019

Total distance traveled inside warehouse cut by 30%





Milkrun vehicle routing for shop-floor logistics
Pickup & delivery problem with time windows
Benchmark won against Gurobi in 2017
Used in Hamburg (de) plant since 2020





Picking optimization in warehouses
Palletization process optimization

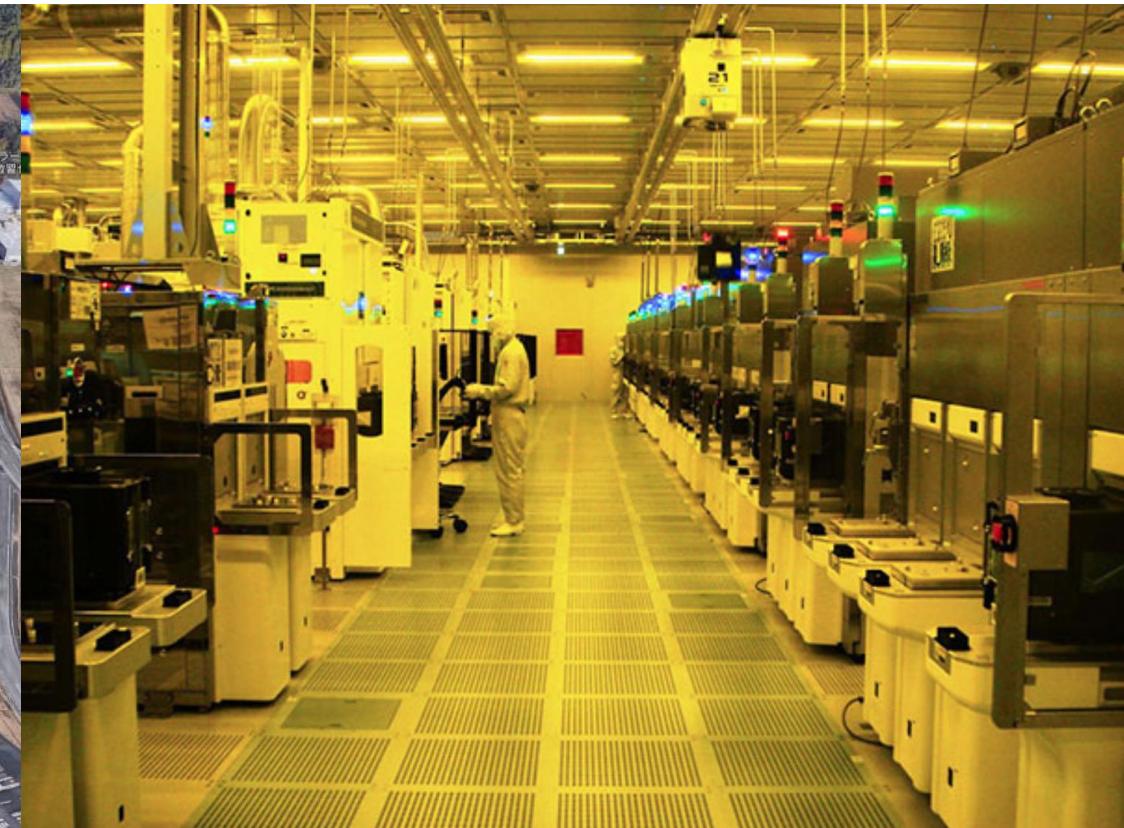


SONY

Facility layout optimization of 4 wafer fabs
at Sony Semiconductor Kyushu Corporation:
Kokubu, Oita, Nagasaki, Kumamoto

Benchmark won against Gurobi in 2017

Sony Semiconductor Manufac...
4000-1 Haramizu, Kikuyo, Kikuchi
District, Kumamoto 869-1102, Japon



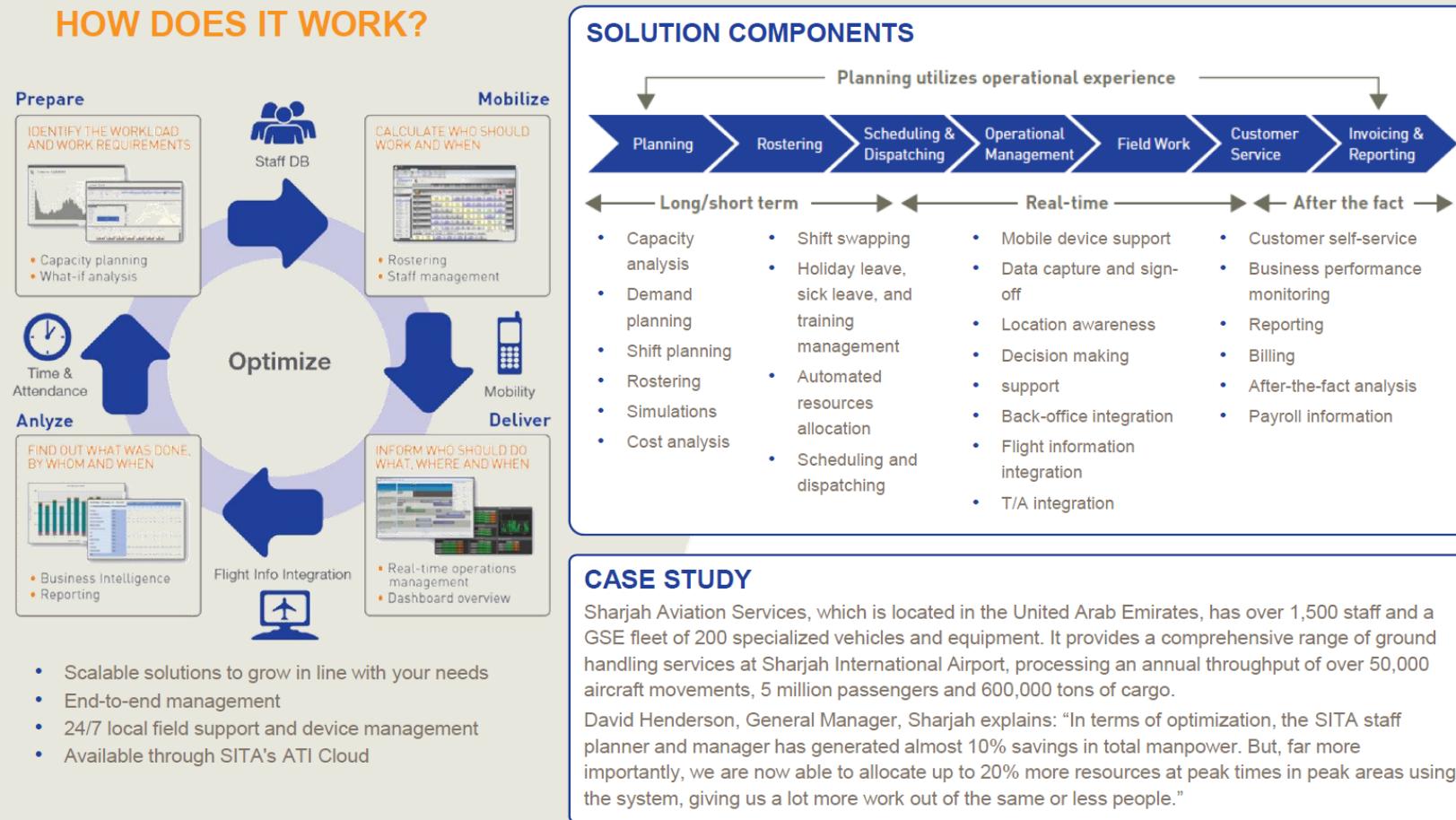
LocalSolver

Workforce management



Airport Management Solution (AMS)

Mobile resource planning, rostering, scheduling, dispatching engines powered by LocalSolver



SITA

Deployed in 30 airports worldwide since 2017

LocalSolver chosen after unsuccessful attempts with MIP and CP solvers



Route & schedule optimization of the drivers at the freight division of SNCF

FRET

Preparing Fret SNCF train drivers' schedules is a complex task involving many operational and regulatory constraints. To solve this highly combinatorial problem, we were looking for a solver capable of handling this complexity and providing high-quality solutions in short running times. LocalSolver was the best solver on the market for this task. It now allows us to compute new optimized plannings every year and to adapt these schedules regularly to meet new requirements.

Vincent Chmielarski, Head of Operations Research, Fret SNCF

99



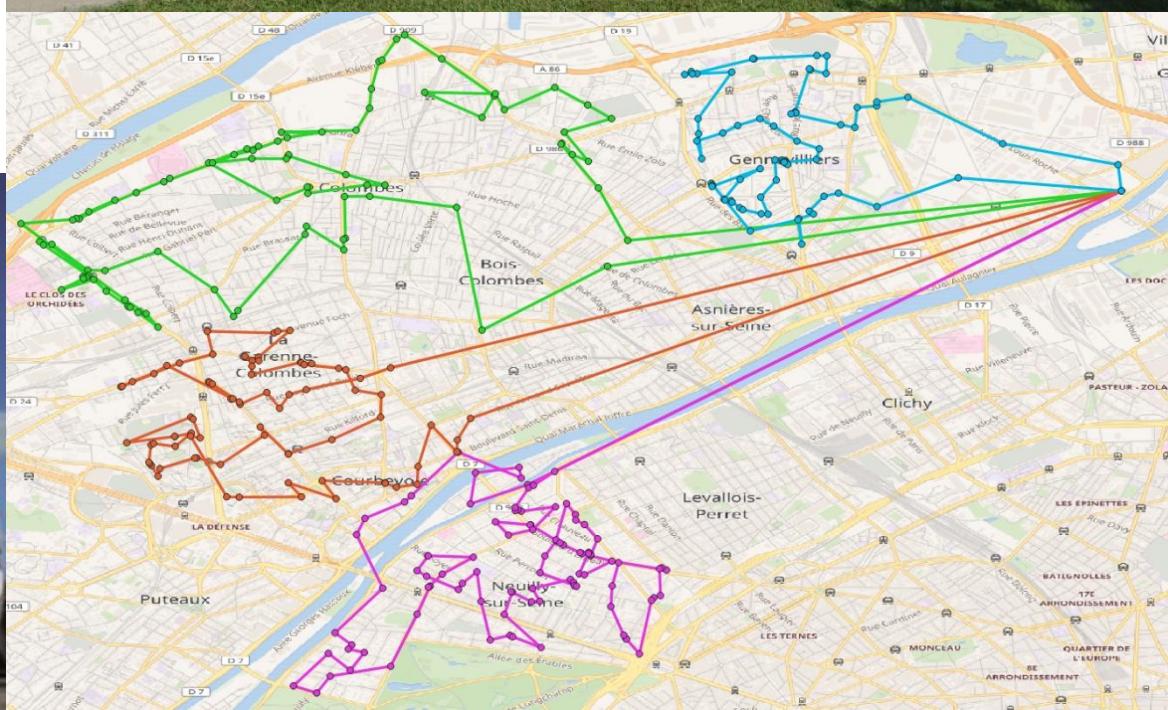
Benchmark won against MIP
Resolution time in minutes
€M of annual savings



JCDecaux

Optimization of the zoning & routing
of field service technicians in France

Benchmark won against the best COTS
solutions of the market in 2018



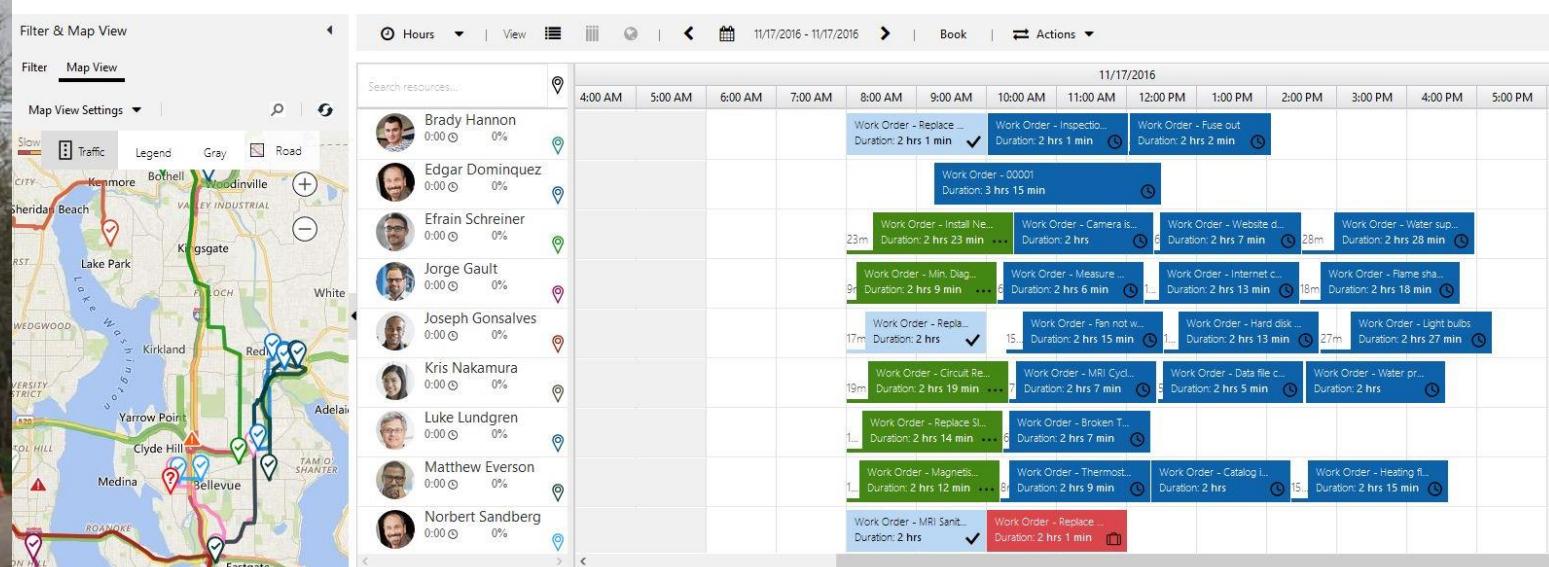
Field service workforce scheduling

- Hundreds of districts to visit by teams
- TSP with soft time windows
- Complex objective function to deal with
- Fast (re)optimization required, in minutes
- Out of scope of MIP solvers
- Won the benchmark against a dedicated heuristic in 2015



Field service workforce scheduling

- Hundreds of technicians per zone
 - 10,000 jobs to schedule and sites to visit
 - Complex HR rules, complex routing constraints
 - Out of scope of MIP and CP solvers
 - Benchmark won against the best COTS in 2018



E DISTRIBUCE

Enedis



Timetabling in the two biggest Brazilian educational companies

Benchmark won against Cplex MIP and CP0 in 2018



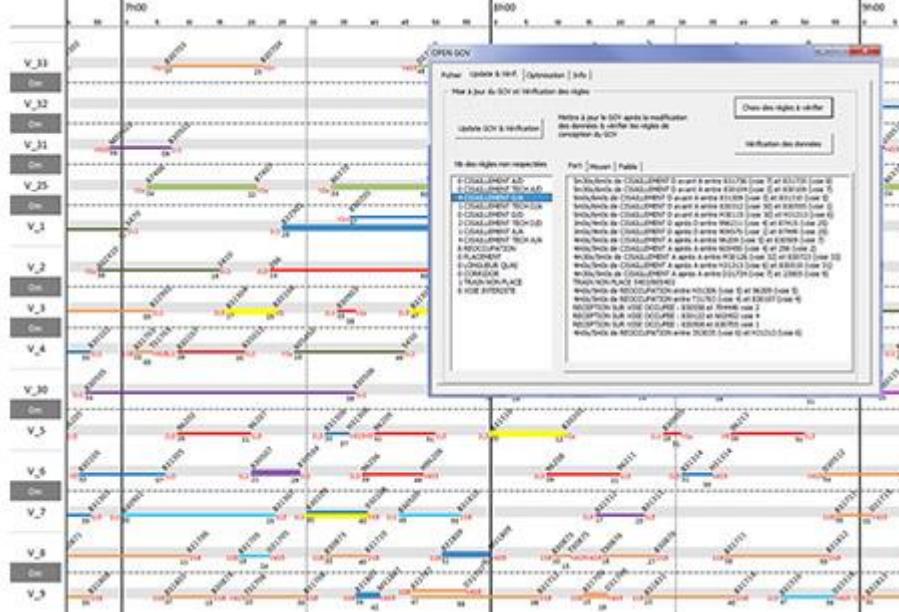
LocalSolver

Railways & airlines





Assignment of trains to platforms under crossing constraints
Benchmark won against Cplex in 2015
Used by 100 users in 25 French train stations since 2016



AIRBUS

99

We've been using LocalSolver at Airbus since 2014 to solve assignment and very large, nonlinear problems. LocalSolver's team provided reactive support on modeling and IT questions that helped us leverage the specific qualities of the solver.

Romain Doucet, Market Forecast Analytics Manager, Airbus

Forecasting long-term aircraft demand
Discrete & nonlinear economic models
Millions of variables, solutions in minutes

Benchmark won against Gurobi in 2014



STELLAR

Aircraft routing & crew scheduling
Benchmark won against Cplex in 2015

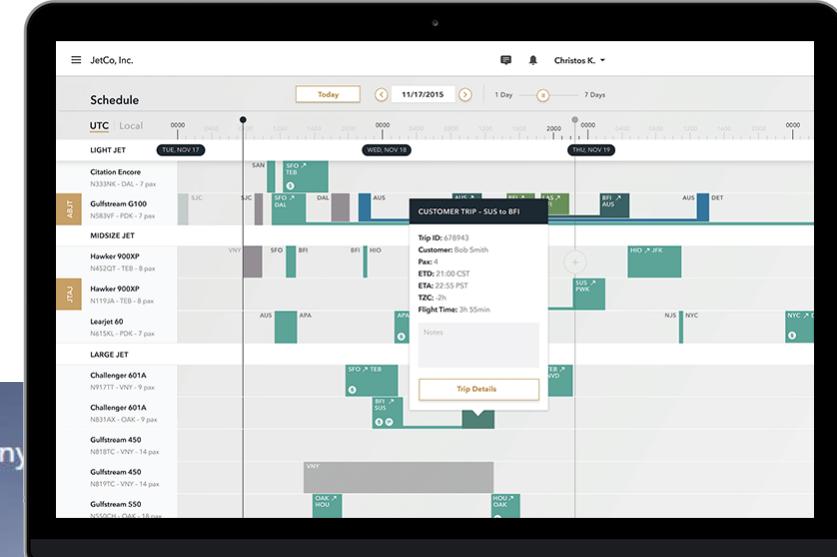
STELLAR

Platform

Marketplace

News & Events

Company



Skies wide open



LocalSolver

Energy, oil & gas

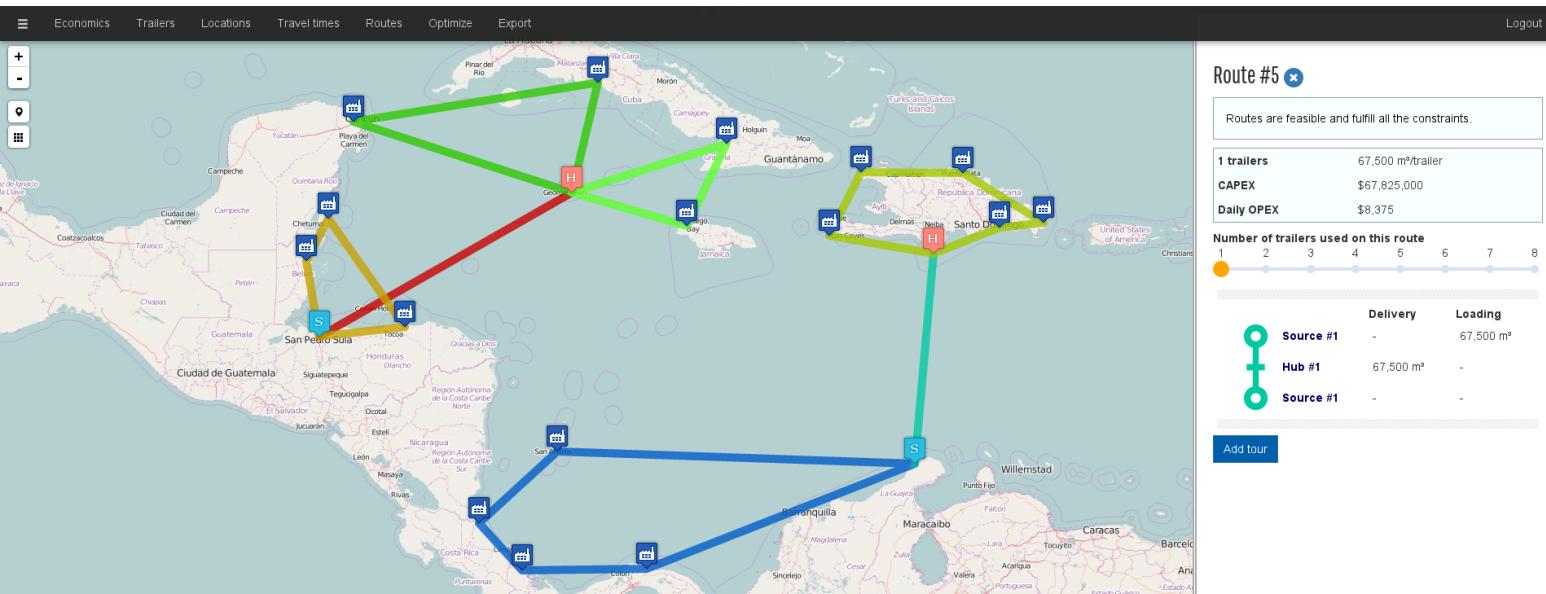




LNG supply chain optimization

Long-term planning of delivery routes and storages

Benchmark won against Cplex in 2015



ENGIE @ENGIEgroup · Jun 29

.@ENGIELabCRIGEN is the winner of #WGC2018 #Innovation award in LNG category with its Optiretail Digital solution

WORLD GAS CONFERENCE

FREDERIC LEGRAND

LNG Lab manager,
ENGIE Group

Optiretail is the digital solution:

- To reduce the cost of the LNG distribution up to 15%,
- To promote the development of new uses of LNG.

Hydropower plant production optimization

- Hydroelectric dams with pumps
- Mixed-variable (on/off + quantitative) decisions
- Nonlinear large-scale dynamic system
- Tight coupling flow and demand constraints



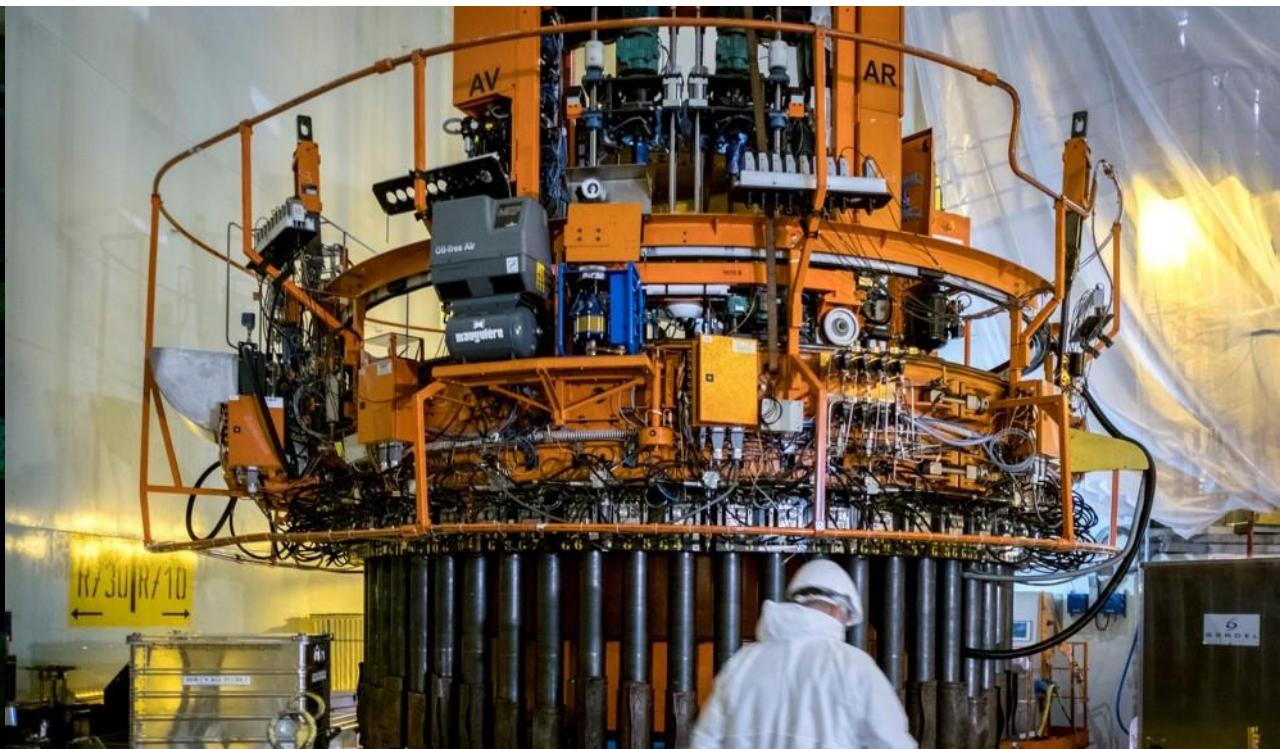
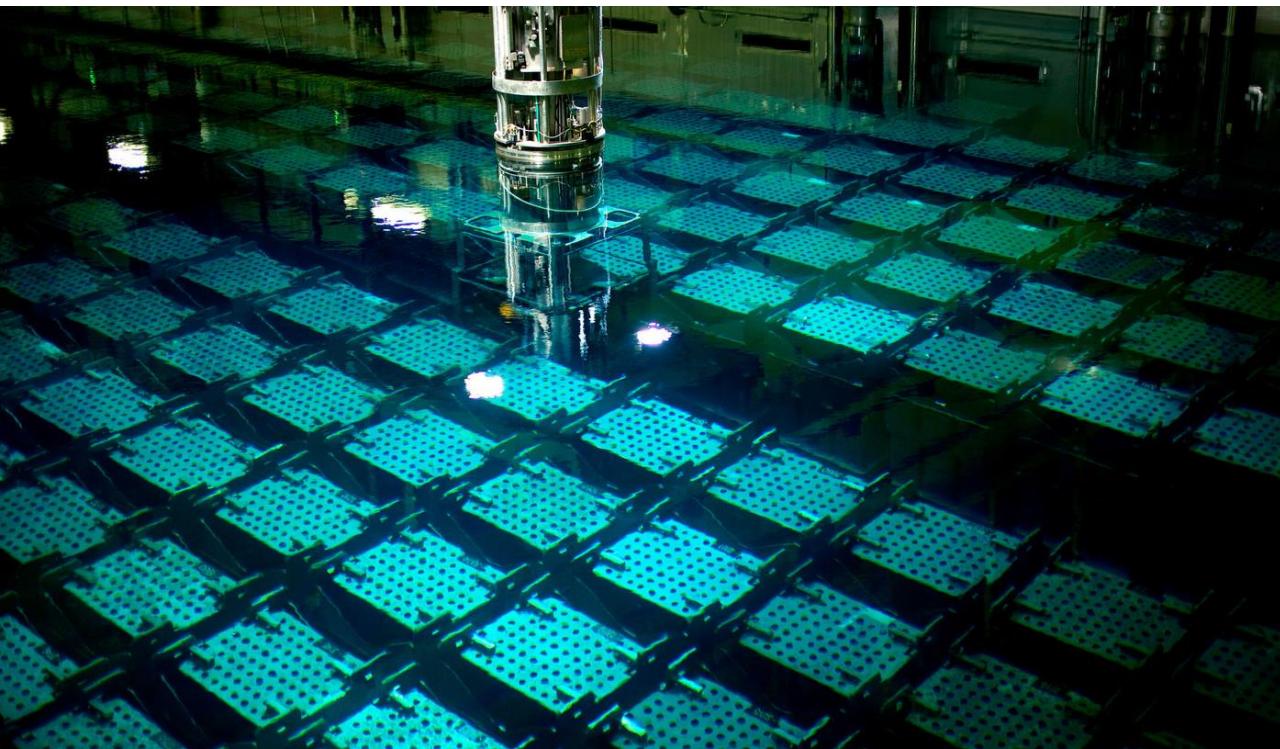
Benchmark won against
Gurobi and Cplex in 2019

- Easy modeling of nonlinearities
- Faster solutions, in minutes
- Scalable for larger planning horizons



Replacement of nuclear fuel assemblies in pools

- Minimizing the completion time of the operations
- Quadratic assignment problem
- Involving millions of terms in the objective function
- Out of scope of MIP solvers
- Won the benchmark against a dedicated in-house heuristic in 2013





Grid operation-based outage maintenance planning

- 1 year of horizon: 365 planning steps
- Schedule constraints, resource constraints, disjunctive constraints
- Minimize costs involving risks: 600 scenarios/day to deal with
- Quantiles easily handled using an external function with LocalSolver
- Won the benchmark against Gurobi and Cplex in 2020





Optimization of electric vehicle charging schedule





Refinery blending & scheduling

- Refinery planning solution
- Refinery scheduling solution
- Product blending solution
- Crude blending solution



Benchmark won against MIP

- Broader modeling scope + ability to connect external simulation codes
→ simpler resolution approaches
- Faster & more scalable
- Better, expert, and friendly support
- Competitive pricing agreement

LocalSolver

Construction & telecom





Optimization of land transport and planning
of earthmoving machines for linear sites





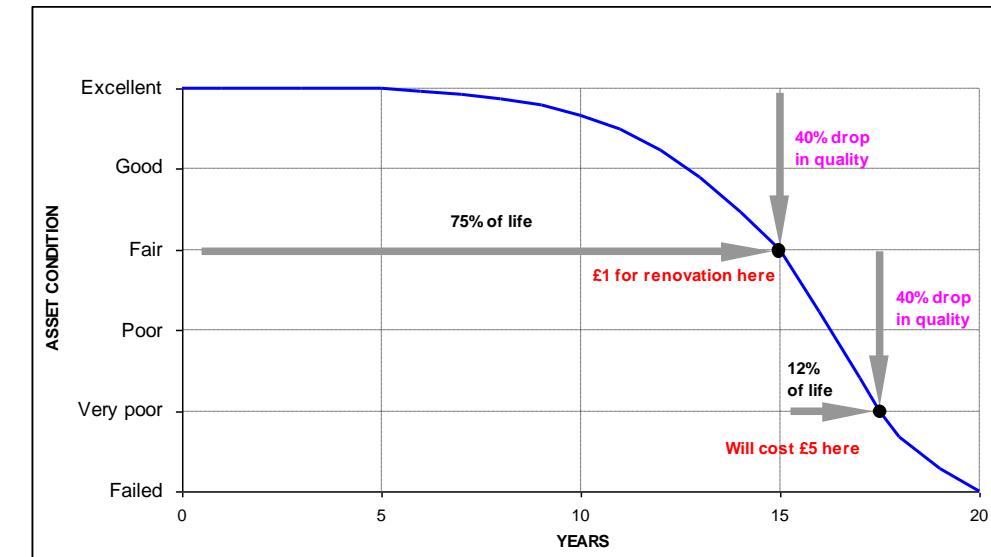
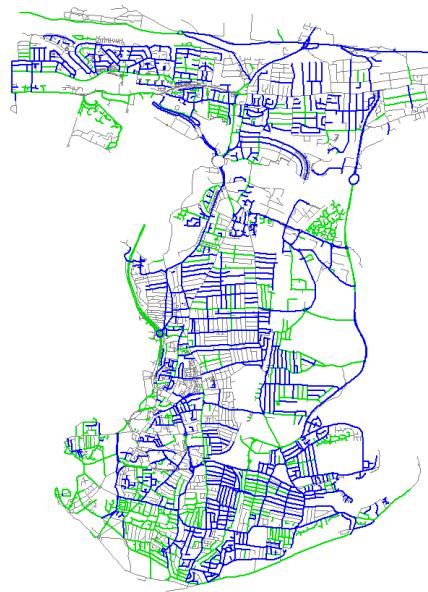
OPTIMIZATION TRANSPORTATION OF DEPOSITS





Long-term road maintenance planning & pricing

- 480 km of streets and roads, divided into 1,000 sections
- Whole life costing = long-term planning over a 25-year horizon
- Millions of variables with nonlinear constraints and objectives
- 0.6% optimality gap in minutes
- Colas UK won the project for about £500 millions



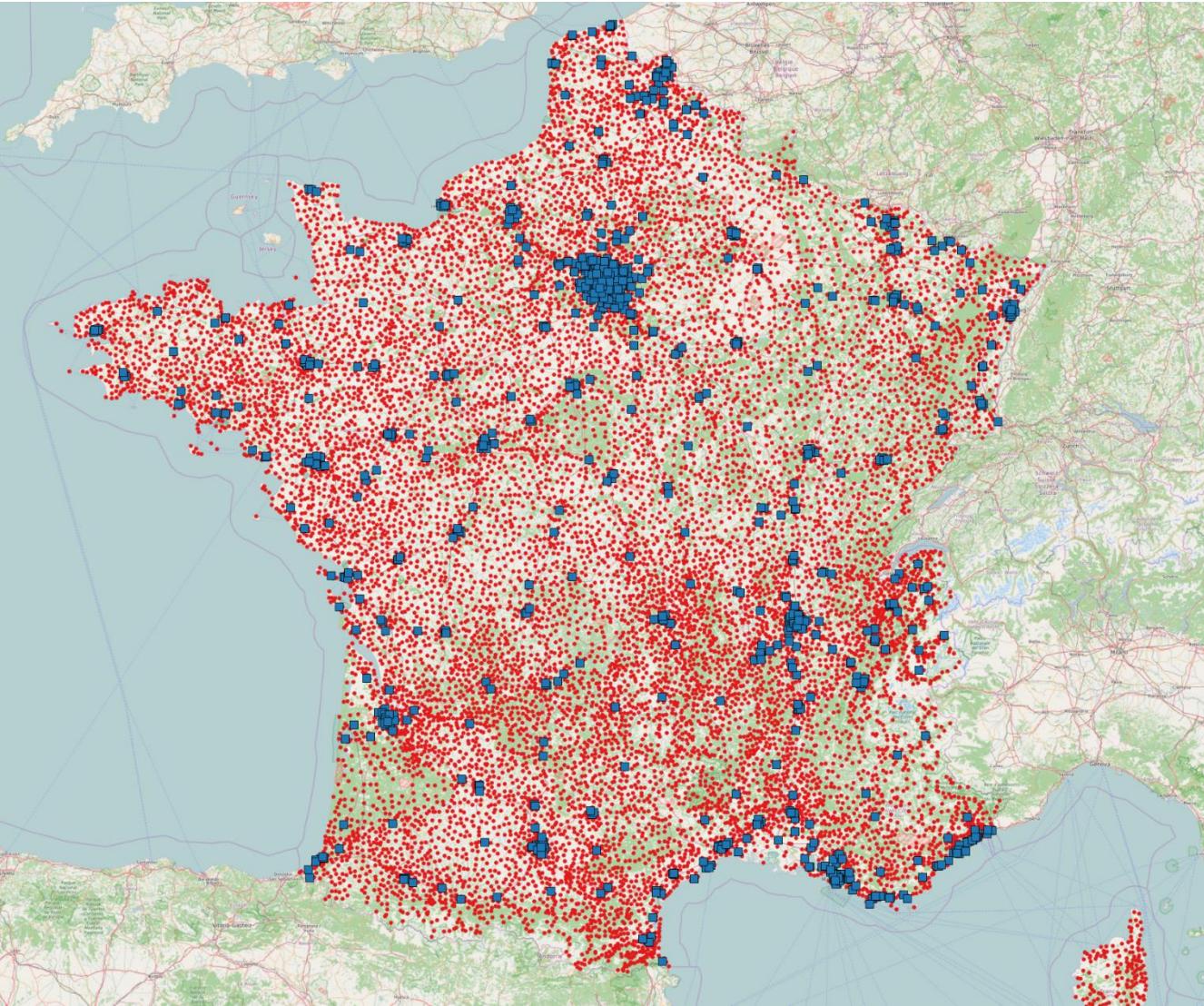


Maintenance planning & pricing of street lighting fixtures

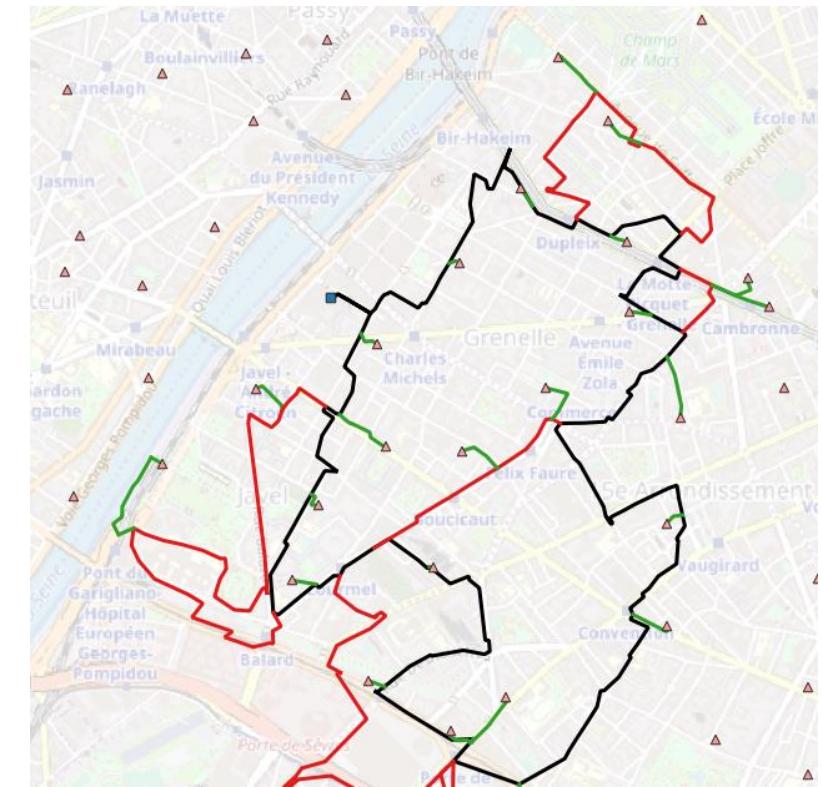
- Strategic, long-term planning over a 25-year horizon
- Considering costs, resources, energy consumptions, failure rates
- Thousands of streets, thousands of lighting fixtures
- 1M variables with nonlinear constraints and objectives
- High-quality solutions in minutes



Optimization of the deployment of Bouygues Telecom networks (ADSL, FTTH, mobile)



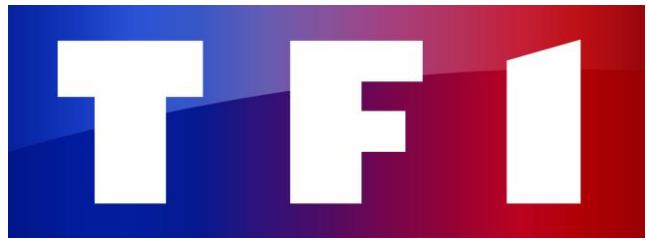
14,000 nodes, 180,000 arcs
2 million binary variables
Solved in minutes using LocalSolver



LocalSolver

Media planning





Optimization of TV advertising campaigns under audience and budget constraints

12 million variables, including 2 million binaries
 15 channels, 1,000 campaigns, 100,000 ads
 Daily solved in minutes since 2012

BRIEF DE CAMPAGNE
 EN COÛT GRP NET sur TF1
 HAVAS MEDIA France

IDENTITE DU PRODUIT	
Groupe annonceur	DANONE
Annonceur	DANONE
Produit (libellé)	TAILLEFINE MAGNUM MPI
Code Produit TF1	87737 87785
Contact	Zakiya BOUJIDA
Cible garante	Femmes RDA + Enfants
Cible produit	
Commentaire Agence	
Le 17/06 : changement de format passage en 26" vs 25". Le 22/06 : décalage de date passage au 4 juillet.	
Commentaire TF1 Publicité	Accepté
Budget estimé : 231 553€	

OBJECTIFS DU PLAN

Version 3 Date 22/06/2011

Dates de la campagne du 04/07/2011 au 31/07/2011

Pression 242 GRP

Budget Net FO prévisionnel (hors premiums & EP) (*) K€

Formats Format n°1 26 secondes Format n°2 secondes

Répartition par tranches horaires (en % GRP)

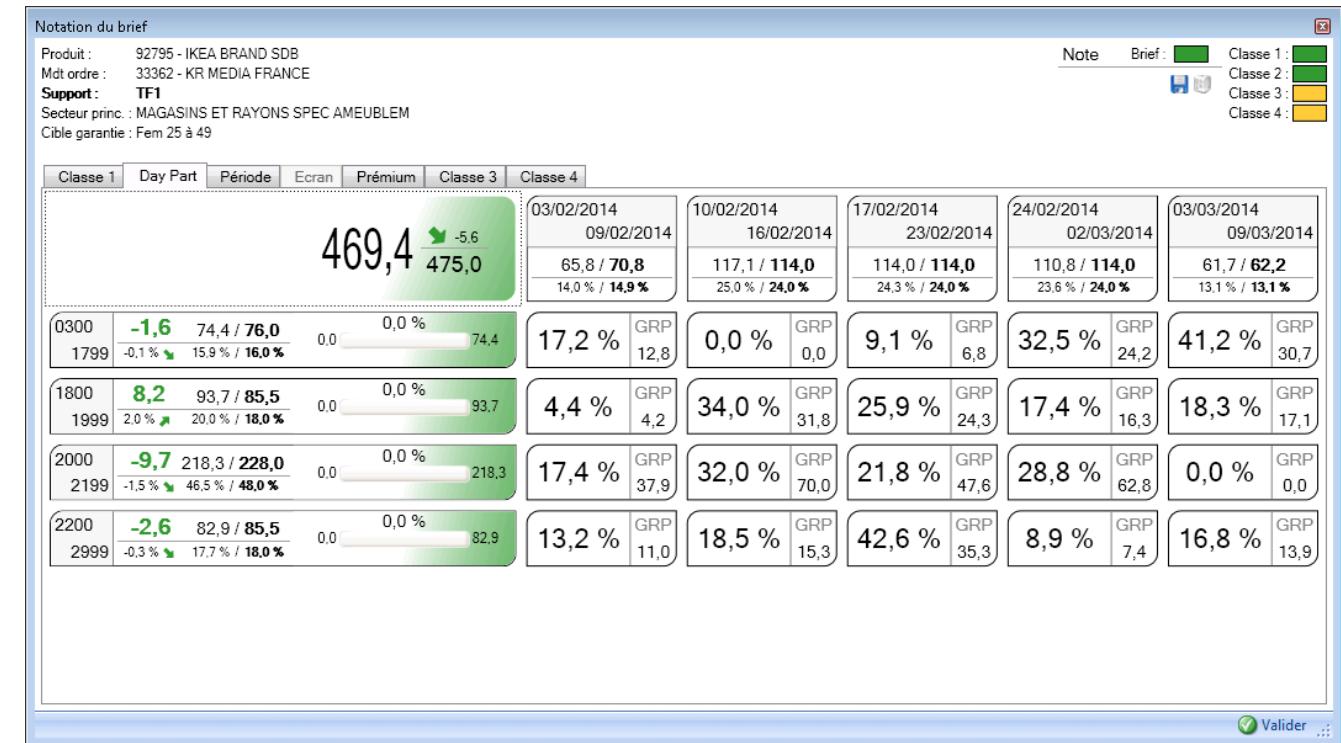
Day 57 %	écrans (0300 - 1899)	138 GRP
Access 6 %	écrans (1900 - 1999)	15 GRP
Peak 26 %	écrans (2000 - 2199)	63 GRP
Night 11 %	écrans (2200 - 2799)	27 GRP

Répartition par semaines actives (en nb de GRP)

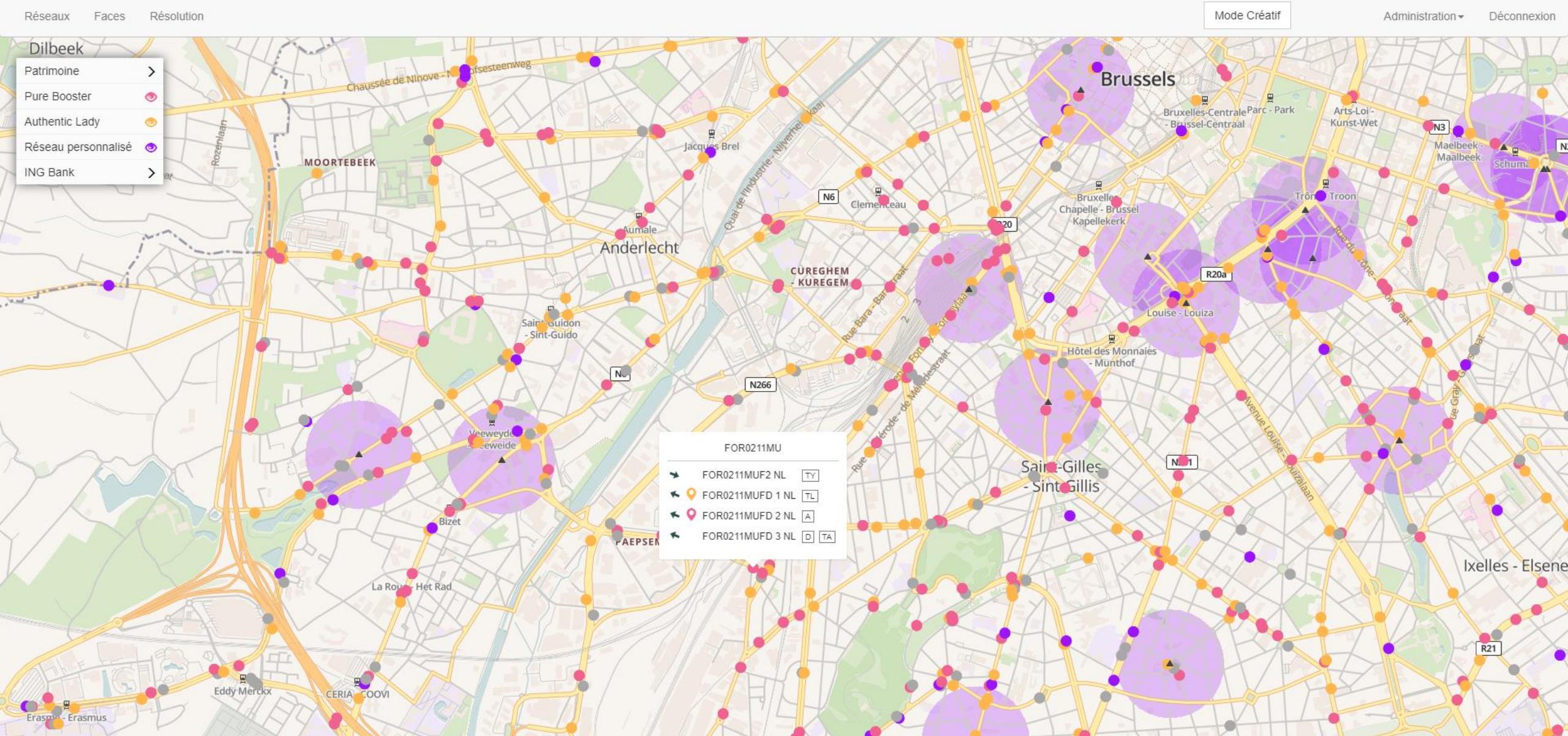
Semaine 1 du 04/07/2011 au 10/07/2011	57	24%	Format 1 100	Format 2 0
Semaine 2 du 11/07/2011 au 17/07/2011	62	26%	100	0
Semaine 3 du 18/07/2011 au 24/07/2011	61	25%	100	0
Semaine 4 du 25/07/2011 au 31/07/2011	62	26%	100	0
Semaine 5 du				
Semaine 6 du				
Semaine 7 du				
Semaine 8 du				
Semaine 9 du				
Semaine 10 du				

Répartition des formats (en %)

Format 1 100	Format 2 0
100	0
100	0
100	0
100	0
100	0
100	0
100	0
100	0
100	0



Optimal planning of D/00H advertising campaigns for several subsidiaries: Airports, Belux, France



Optimisation réseaux Paramètres Réseaux Faces

Carte des différents réseaux



Liste des faces

Filtrer par :

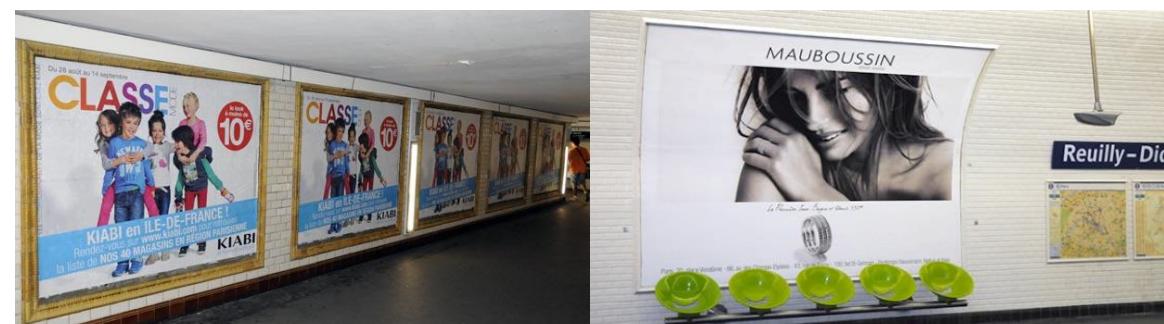
Lignes...	Villes...
Q-100 A	
Q-100 B	
Q-100 C	

Format Trafic couloir Trafic quai Ville Type ligne Type ouverture Cib

Optimal packaging of OOH inventory
in Paris underground and train stations

Partitioning 60,000 advertising faces
into products from 100 to 500 faces

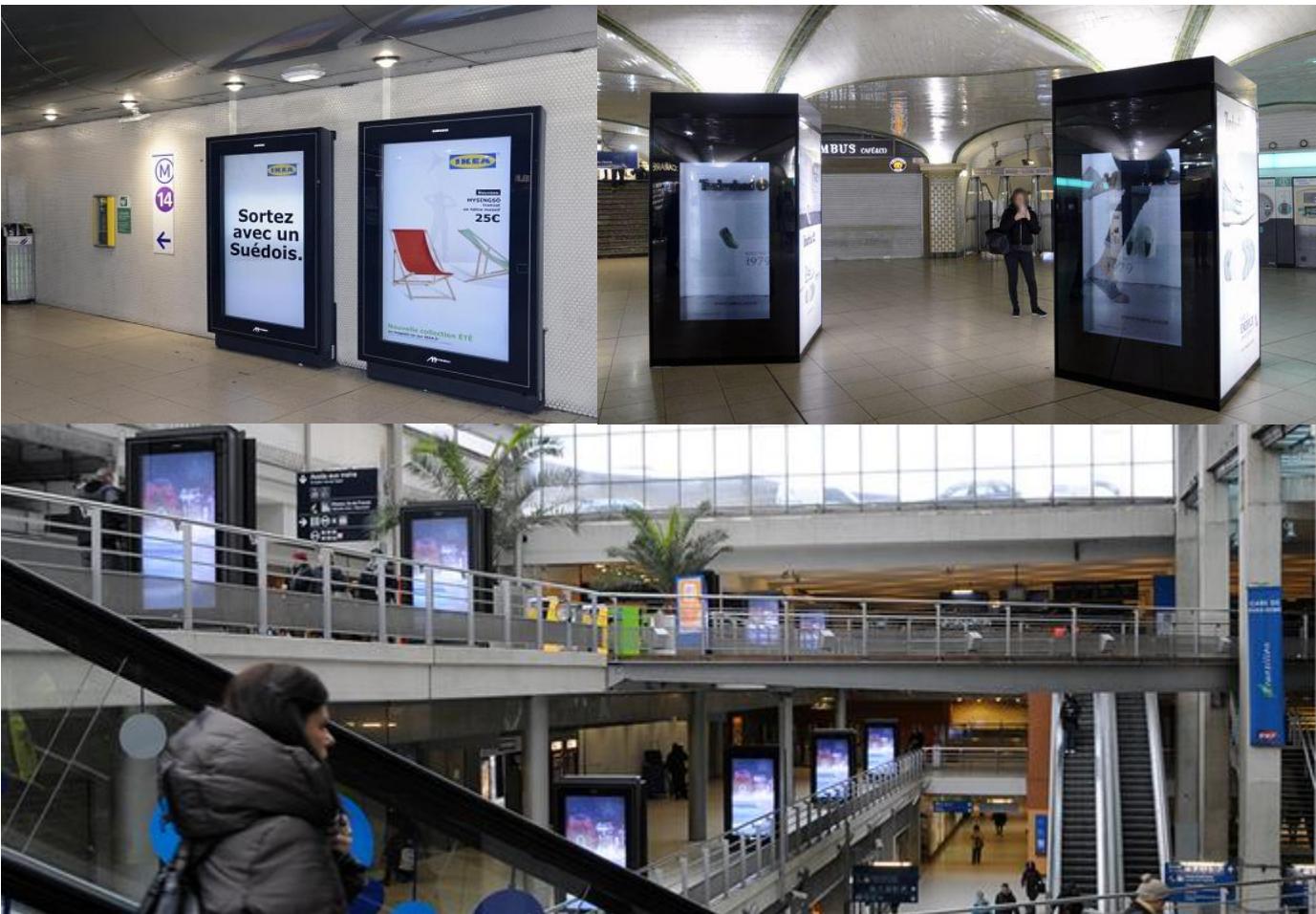
- Covering a maximum of stations
- Balanced according to the traffic
- 20 criteria optimized for quality of service
- Solved in 1 minute of running time
- Monthly used since 2013



Automation & optimization of the selling of digital briefs

- 2,000 digital faces
- Hundreds of briefs optimized each month
- 20 criteria optimized for each brief
- Solved in minutes of running time
- Daily used since 2016

Optimal planning of DOOH campaigns
in Paris underground and train stations





Jean Mineur
Mediavision



Optimal planning of ad campaigns in cinemas
3,300 movie theaters in 520 cinemas



LA SOCIÉTÉ

LE MEDIA

BOX OFFICE

L'OFFRE

CONTACTS



LE GRAND ÉCRAN des médias

CONTACTEZ-NOUS

Powering VIOOH DOOH DSP & SSP,
used by UK media agencies and brands

Currently deployed worldwide



VIOOH

The collage consists of four images:

- Top left:** A blurred view of a subway station platform with a large white star logo on the ceiling.
- Top right:** A curved screen in a subway station platform displaying an advertisement for Addison Lee.
- Bottom left:** A dark blue background with white text: "USE DOOH TO DRIVE MORE CUSTOMERS TO STORES DEALERSHIPS AND RESTAURANTS". It includes a double-headed arrow icon and a blurred image of a person walking.
- Bottom right:** A bright blue background with a white "SALE!" sign and a drawing of a running shoe.

S4M

VIOOH

Powering Mereo “Price & Place” D/OOH SSP,
used by Ocean Outdoor (UK) and Pikasso (MEA)



The image shows a bustling urban scene at night, featuring a large digital billboard on a building facade. The billboard displays a vibrant advertisement for Yves Saint Laurent's "BLACK OPIUM" fragrance. The text "PASS IT ON" is prominently displayed in large, glowing letters, surrounded by smaller circular frames containing the YSL logo. Below the main text, there's a smaller image of the perfume bottle. In the foreground, people are walking on the sidewalk, and a red double-decker bus is visible in the background. The overall atmosphere is lively and commercial, typical of a major city center like London.

OCEAN

About Ocean Locations & Networks Research & Insights Content & Creativity Ocean Labs Technology Asset Management Investors

mereo +

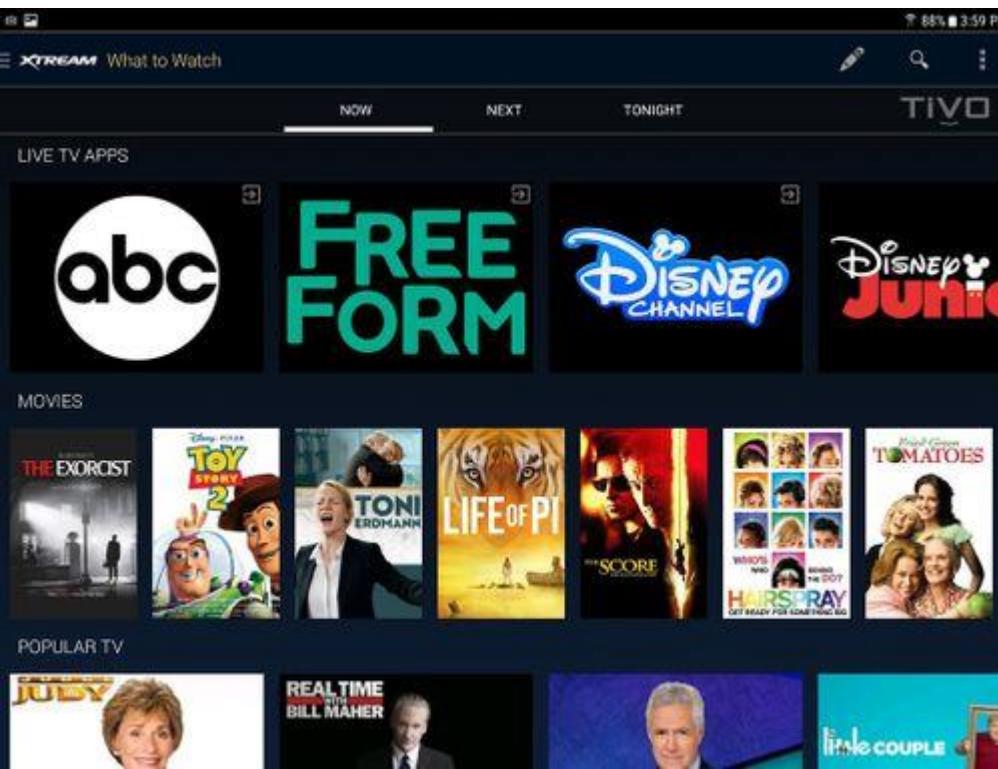
99

We were looking for an optimizer to solve our large out-of-home media planning problems. After a benchmark against CPLEX, LocalSolver proved to be the best performing solver; it could handle large-scale problems and find high-quality solutions in minutes. It enabled us to deploy our media planning solution at Ocean Outdoor, a UK premium DOOH operator. LocalSolver was able to make us a commercial proposal that opened up a long-term partnership.

Emmanuel Delmasure, Software Engineer, Mereo



Powering TiVo IPTV SSP, used by
Mediacom Cable Communications, US cable television provider
Benchmark won against Gurobi in 2015



LocalSolver

Banking, finance, insurance





Mortgage credit optimization at Caisse d'Epargne

10,000 end users (500/day) in 4,000 branches

120,000 credits optimized each year since 2016

Mixed-variable nonlinear optimization

Optimal solutions in seconds





Pricing optimization of non-life insurance products

- Non-convex cubic objective with linear constraints
- Huge instances to solve: **1 million variables**
- Near-optimal solutions found **in seconds**
- Won the benchmark against NLP solvers

An advertisement for AXA insurance. It features:

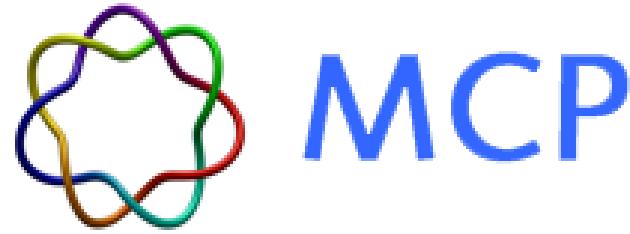
- A blue circle containing the number '#1' with the text "GLOBAL INSURANCE BRAND FOR THE 8TH CONSECUTIVE YEAR".
- The text "exclusive offer" in gold.
- A blue arrow pointing right containing the text "car insurance **15%** discount" and "Plus FREE CAR RESCUE with optional Lost Key Insurance for £11".
- A red arrow pointing right containing the text "home insurance **10%** discount" and "Plus an EXTRA 20% DISCOUNT for AXA car customers".
- A "Discount for members" banner at the top right.
- A "Get a quote!" button at the bottom left.
- Call-to-action text at the bottom: "www.axani.co.uk/creditunion" and "Visit your local AXA Branch".

Get a quote!

www.axani.co.uk/creditunion 02892 445566 Visit your local AXA Branch

redefining / standards





Portfolio optimization

- Nonconvex, nonsmooth problem
- Medium-sized instances: 10,000 variables
- Near-optimal solutions found in seconds

Won the benchmark against NLP solvers

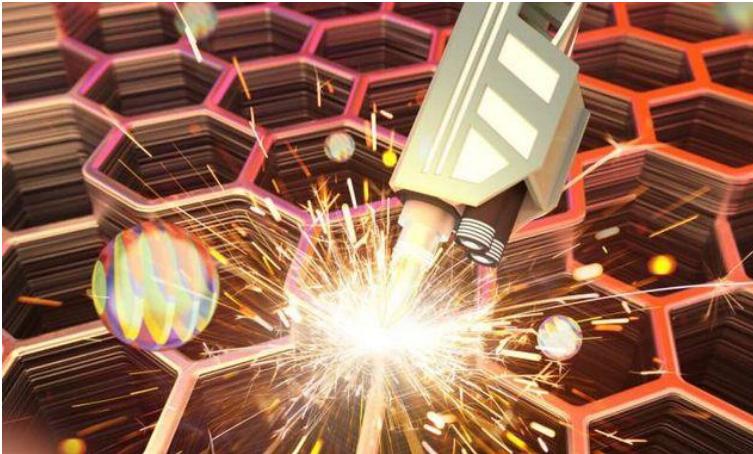
- No need to reformulate or approximate the problem to be smooth
- No need to reformulate or approximate the problem to be convex



LocalSolver

Design engineering



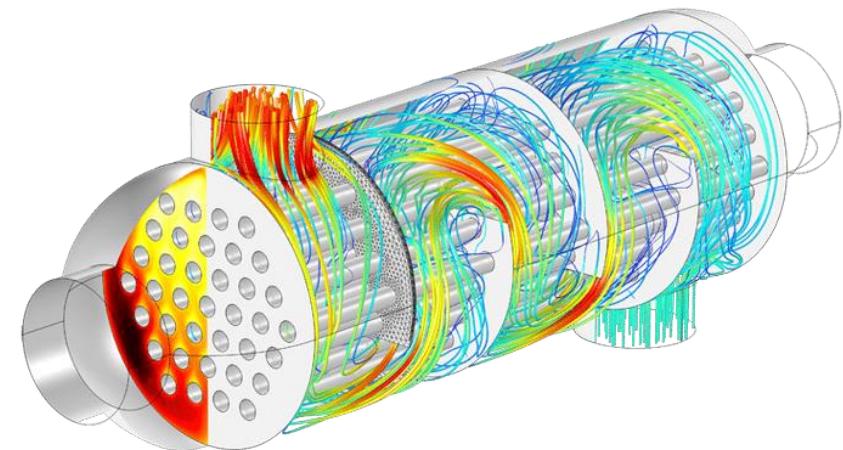


Simulation optimization for better design decisions

- Minimize the weight of the heat exchanger
- While maintaining pressure losses and heat duty
- Each call to the CFD simulator takes several hours

Benchmark won against the COTS in 2018

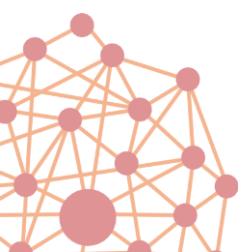
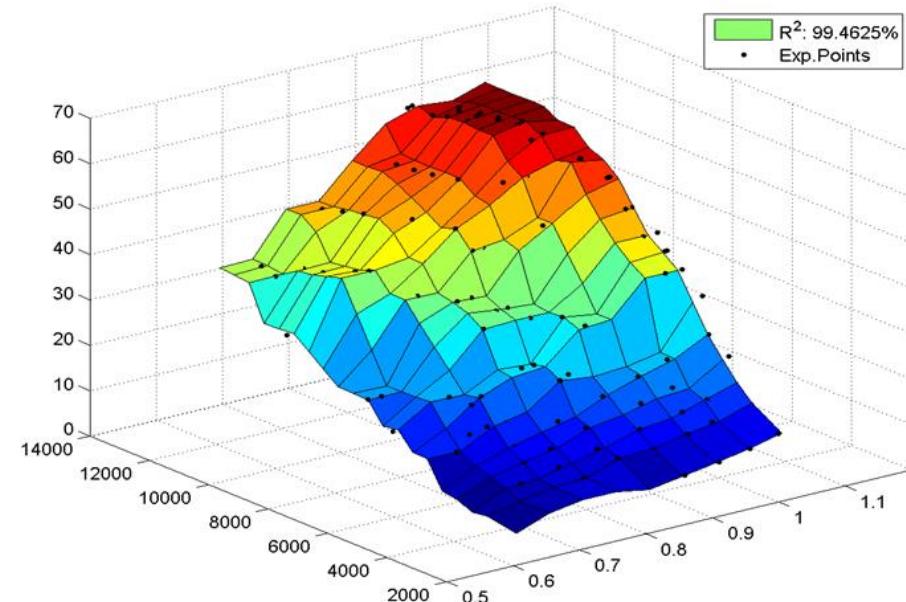
- 7 decision variables
- From 200 to 500 calls to the simulator only
- Easy management of infeasible designs
- Innovative designs allowing 20% of weight decrease



GROUPE RENAULT

Optimal calibration of engine maps

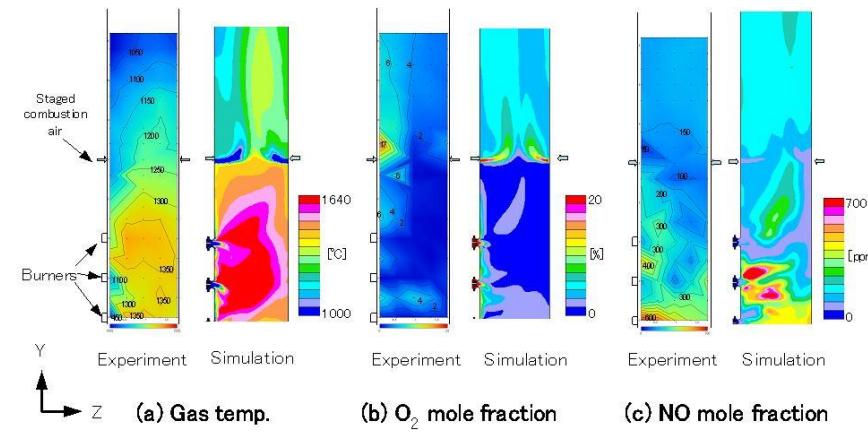
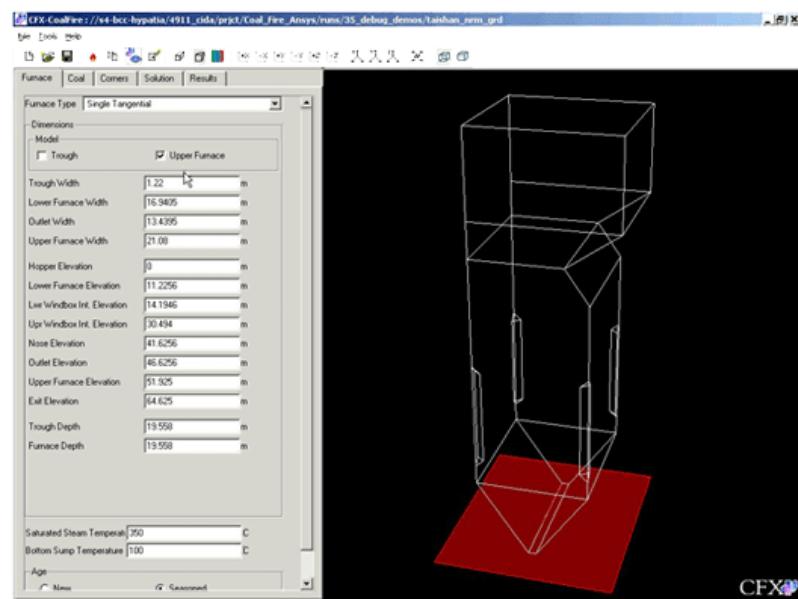
- Simultaneous calibration of 7 maps of size 17x20
- Large scale: 2,400 parameters to decide
- Evaluation by calling Matlab Simulink statistical models (10 calls per sec)
- 1st objective: fitting experimental measures
- 2nd objective: smoothing maps (avoiding large variations)
- LocalSolver delivers better fitting and smoothing in hours of running time
- Resulting in the automation of the calibration process, from weeks to 1 day of work





Designing pulverized coal boilers

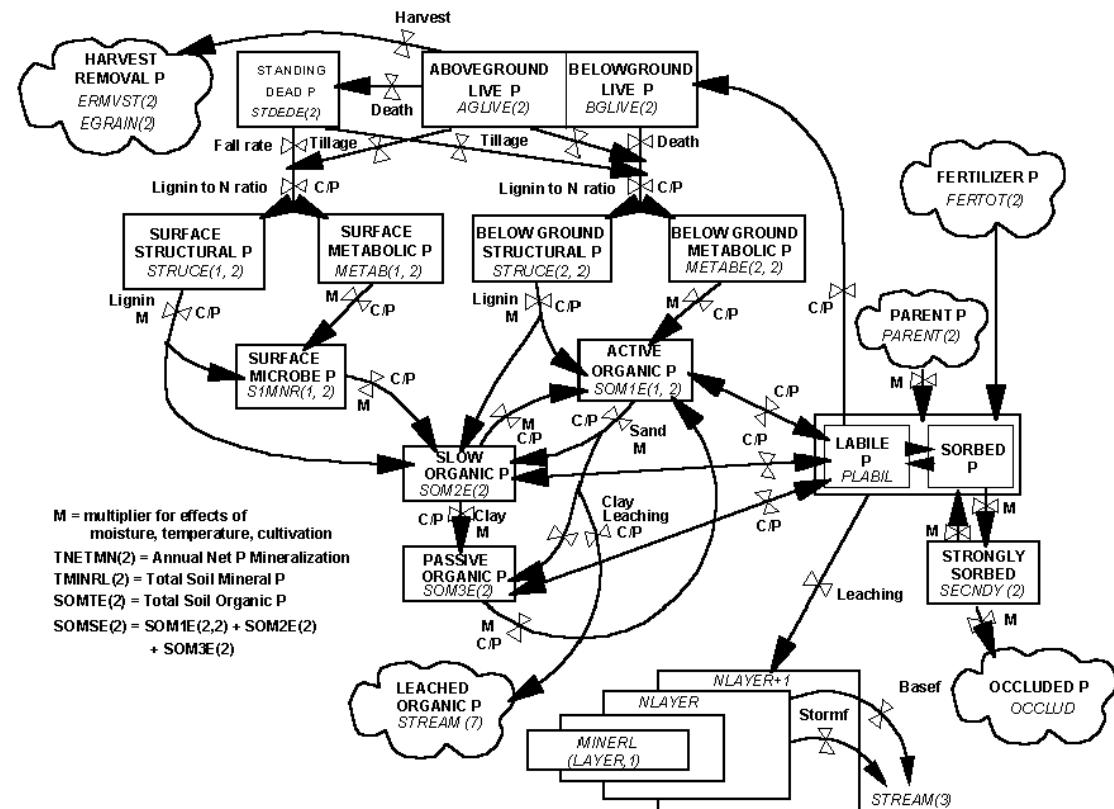
- Optimize coal injection in the boiler
- 6 criteria to optimize: energetic performance vs. emission of pollutants
- Simulation optimization: each call to the CFD simulator takes 12 hours
- 24 heterogeneous variables: on/off, angles of injection, flow rates
- Won the benchmark against a dedicated genetic algorithm





Optimal fertilization of agricultural parcels

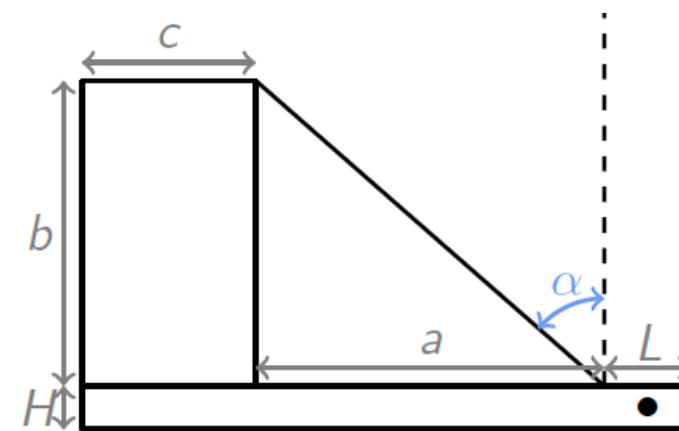
- Nonlinear dynamics of N, C, K over time
 - 5,000 binary and continuous variables
 - Call to the Century simulation software
 - Benchmark won against dedicated surrogate modeling-based algorithms in 2016





Designing sailboat weathervanes

- Used to measure the wind, to drive sailboats
- High precision needed in racing competition
- Highly nonlinear optimal control problem
- **Integer variables** because of precision (0.1 mm)
- 2 criteria optimized
- Won the benchmark against NLP solvers



LocalSolver

Data science



Optimization-related data science problems

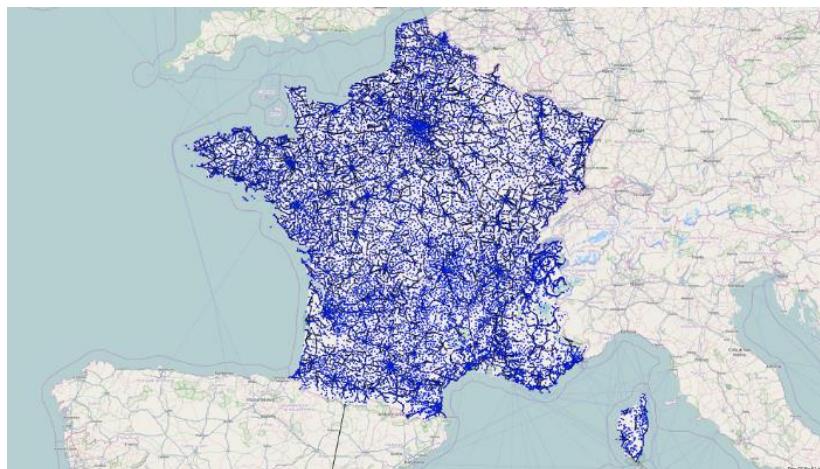
- Clustering like [K-Means \(MSSC\)](#)
- [Curve fitting](#)
- Forecasting

Sparse Least Squares Linear Regression

Find a **sparse fitting** model
with only a few nonzero parameters

$$\begin{aligned} & \min_{\beta} \|Y - X\beta\|_2 \\ & \text{st. } \|\beta\|_0 \leq k \end{aligned}$$





Mapping antennas of concurrent telco networks

Having approximate distances between antennas from signals, find positions of antennas in the network

Least squares problem

- 25 antennas, 10,000 point-to-point signals
- Resulting model: 100,000 continuous variables
- Convex quadratic objective
- Near-optimality in 1 minute



LocalSolver

Licensing & pricing



Pricing

Development use

- **Free Trial:** 1 month free for 1 development team, restricted to development use
- **Desktop:** 1 named user, desktop or laptop, 1 simultaneous use, restricted to development use
- **Server:** server, unlimited number of users, price per simultaneous use, restricted to development use

Production use

- **Unlimited development and production use:** unlimited number of developers, unlimited number of applications, unlimited number of machines, unlimited number of end users, worldwide.

	Monthly
Dev Desktop	€790
Dev Server	€2,400
	Annual
Prod Unlimited	€49,000

Also available in
USD (\$) and JPY (¥)



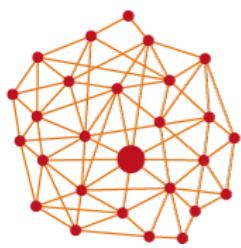
All-inclusive licensing

- Best-in-class maintenance & support services
- Experienced: 20 years of experience in solving real-world optimization problems
- Dedicated: you always talk with the same Optimization Scientist
- Responsive: answers in hours by email, phone, or through a web meeting
- Each day we help you to model and solve your problems using LocalSolver
- 1 training session each year with our Optimization Scientists
- 2 new versions each year with performance improvements and new features
- Corrective patches for any version, even older ones
- Until 10,000 hours of computation in the LocalSolver Cloud



« Exchanging with the LocalSolver team is
always extremely fruitful and highly pleasant »

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www.localsolver.com