Machine Learning and Optimisation
An ongoing journey
Matteo Pozzi – CEO Optit srl
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About us

**Founded in 2007**

**Spinoff** of the Operations Research (OR) team of the University of Bologna

We develop **solutions and services** based on analytics & optimization

**Young and highly skilled team:** everyone holds a **STEM Master Degree** or **PhD**

We are **Data scientists**, **Business consultants**, **Operations Research specialists**, and **SW application dev. professionals**

**We work for medium and large enterprises** in **several industries** in Italy and abroad:
- Energy
- Waste
- Logistics
- Retail

We participate in the **scientific community** and active in fostering **“OR in Practice”**

**2 main Offices**

Consultancy services and Commercial HQ in **Bologna**

SW Factory in **Cesena**
Our approach

Know how transfer

Business issue → Data Management → Modelling, Analysis & Optimisation → Solution

Descriptive  Predictive  Prescriptive
CCD Staff Management Optimisation
The business issue

WHO

Commercial company of Multi-Utility Hera Group, serving over 4M user

WHERE

• > 80 Customer Contact Desks
• 8 Top and 20 Medium
• > 750k customer contact/year
• ≈200 staff

WHAT

• Effectiveness: Improve customer contact experience (decrease waiting time)
• Efficiency: Balance Front/Back office activities
CCD Staff Management Optimisation
Optit’s solution

Invoicing volumes
Queueing systems data
adjust
configuration
SLAs

Forecasting model
(IM5 model tree)

Optimisation model
(min FTEs (satisfying SLAs))

Simulation model

arrivals

arrivals

Planning solution

feedback

Operational planning (day-schedule)
Mid-term planning
(online) Reporting
CCD Staff Management Optimisation Results

RESULTS

<table>
<thead>
<tr>
<th>Metric</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average monthly requests</td>
<td>+34%</td>
</tr>
<tr>
<td>Average Waiting Time</td>
<td>-35%</td>
</tr>
<tr>
<td>% Customers Waiting &gt; 40 min</td>
<td>-49%</td>
</tr>
<tr>
<td>Customer Satisfaction Index</td>
<td>+13%</td>
</tr>
<tr>
<td>Staff available</td>
<td>-3%</td>
</tr>
<tr>
<td>Back Office Requests Backlog</td>
<td>-94%</td>
</tr>
<tr>
<td>Avg. BO time per employee</td>
<td>+56%</td>
</tr>
<tr>
<td>Monthly Sales by Desk Staff</td>
<td>+706%</td>
</tr>
</tbody>
</table>

IMPACTS

- Used by customer since 2011
- Finalist at International Awards

SO WHAT

- Optimisation > Predictive > Descriptive
- Forecast accuracy was crucial KPI from start
- Alignment DSS - business process is key success factor
Energy Plant Management
The business issue

THE BUSINESS OBJECTIVE

How to maximise Operating Margins of complex Energy CHCP Production Systems in view of variation of demand, prices and operating conditions?

CHALLENGES FOR DECISION MAKING

- Complex plant configuration
- Technical and operative constraints
- Fine granularity (60'-15' - ...)
- Multiple cost/revenue factors
- Energy demand forecasting
- Operating and managing reports
Energy Plant Management
The solution

- Forecasting model (M5/Inertial/neural network)
- Heat demand
- Optimisation Model
  - max «EBITDA» (satisfying heat demand)
- Operational planning (daily-schedule)
- Mid-Long term planning (budget)

- Weather forecast
- Historical data
- Machine signals
- Yield curves
- Alerts
- Plant configuration
- Market prices (EE)
Further applications in Waste Logistics Optimisation

Waste Collection Service Strategic & Tactical Optimisation
- Waste demand analysis
- Multi-dimensional Clustering
- Optimised routing

Waste Treatment & Disposal Supply Chain Optimisation
- Waste & disposal treatment mapping
- Integrated logistics / plant management optimisation
- Process integration platform
Full Integration of Machine Learning (and Analytics) in Optit’s Portfolio

- Optimisation best supported by full stack analytics approach
- Integrating increasingly sophisticated Machine Learning approaches to provide additional Customer Value
- Field data integration (Industry 4.0) changing DSS approach (ongoing):
  - Ongoing confrontation between planned/actual
  - Use of field data to estimate optimisation parameters
  - Operational planning horizon tend to shift towards quasi-real time (process automatization)
Thank you for your attention!

Please contact us for to know more:
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