UNIVERSITÀ
DEGLI STUDI
DI UDINE

INTELLIGENT PLANNING AND SCHEDULING SYSTEMS

Manufacturing 4.0: la ricerca che serve all'impresa

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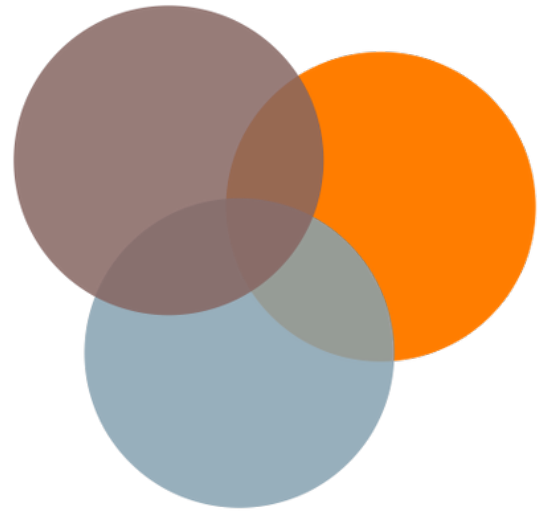
Luca Di Gaspero
luca.digaspero@uniud.it

DPIA, University of Udine, Italy



Business Analytics

Business Analytics = Data Analytics + Intelligent Decision Making

- Focus on Quantitative methods (vs Qualitative)
- (Very) large data sets
- Exploits the potential value of the data (from data to knowledge)
- Aims at Smart Decision Support Systems

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Evolution of Business Analytics

1.0 Descriptive Analytics: gains insight from historical data (exploring patterns, relationships) "What has happened?"

2.0 Predictive Analytics: employs predictive modeling (forecast future results) "What could happen?"

3.0 Prescriptive Analytics: recommends decisions using optimization and simulation "What should we do?"

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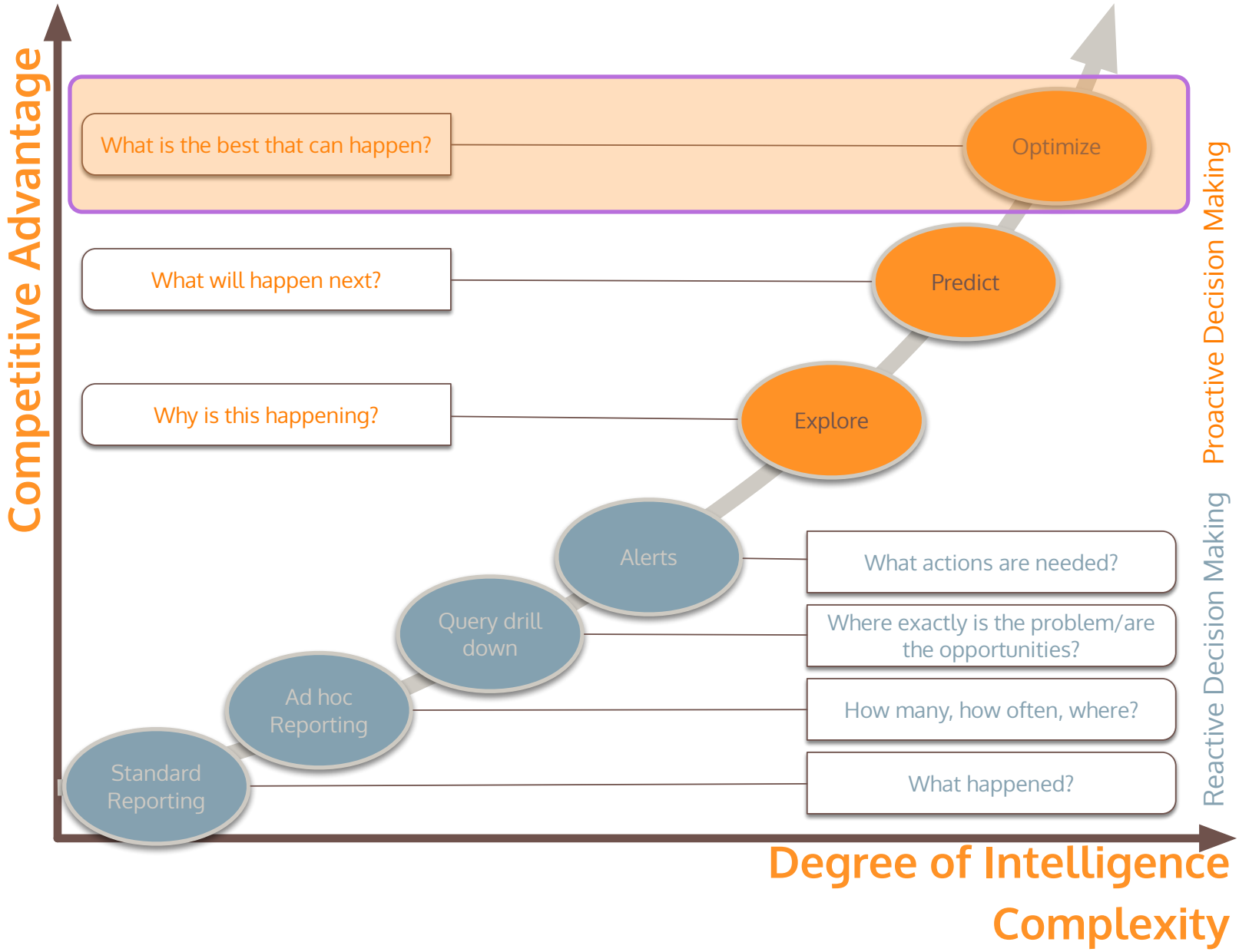
Competitive Advantage
What is the best that can happen?
Optimize
What will happen next?
Predict
Why is this happening?
Explore
Alerts
What actions are needed?
Query drill down
Where exactly is the problem/are the opportunities?
Ad hoc Reporting
How many, how often, where?
Standard Reporting
What happened?
Proactive Decision Making
Reactive Decision Making
Degree of Intelligence
Complexity

SaTT Research Group

The mission of the Scheduling and Timetabling Research Group is to provide effective, robust, and scalable optimization solutions for real-world industrial problems with a temporal dimension in the fields of production planning, process scheduling, workforce management, integrated logistics, inventory management, exploiting and devising innovative intelligent methods from forefront research.

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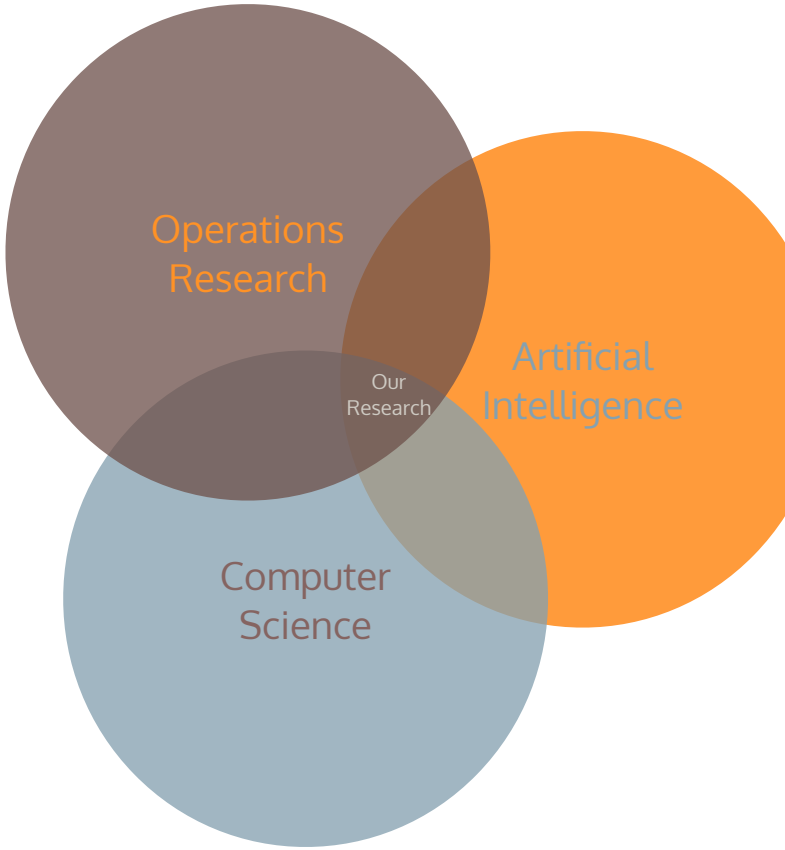
- Andrea Schaerf, full professor of Information Technology
- Luca Di Gaspero, associate professor of Information Technology
- Sara Ceschia, PostDoc
- Tommaso Urli, currently PostDoc at CSIRO, Canberra, Australia

http://satt.diegm.uniud.it

Optimization Methods

Our expertise covers a number of different optimization methods and approaches from different research fields:

- Local Search (AI)
- Constraint Programming (AI)
- Nature Inspired Computing: Genetic Algorithms, Ant Colony Optimization, Particle Swarm Optimization, … (AI)
- Linear Programming (OR)
- Mixed Integer Programming (OR)
- Object-Oriented Frameworks (CS)



Timetabling and Scheduling

We designed and developed research- and production/customer-level software (marked) for the following problems:

- Educational Timetabling: Examination Timetabling[1], Course Timetabling[1], Curriculum Design
- Workforce Planning and Scheduling: Shift Design[2] (Call-centers, Air Traffic Control), Workforce Scheduling[1], Nurse Rostering
- Healthcare Management: Patient Admission Planning, Operating Room Surgical Scheduling
- Production scheduling: Steelmaking and Casting Integrated Planning and Scheduling[3]

[1] EasyStaff S.r.l., [2] Ximes GmbH., Vienna, Austria, [3] Danieli Automation S.p.a.

Logistics and Smart Mobility

- Optimized Logistics: real-world Vehicle Routing with heterogeneous carriers, Integrated Routing and Packing, Ready-Mixed Concrete Delivery[4]
- Smart Mobility: balancing bike sharing systems
- Healthcare logistics: integrated homecare routing and scheduling

[4] Ateikon S.r.l.

Industrial Projects and Partnerships

TECNEST Supply Chain: Cultura e Soluzioni — Production Scheduling

CYBERTEC — Production Scheduling

EASY STAFF soluzioni per l'ottimizzazione — Workforce Scheduling, Educational Timetabling

Google — Focused Grant Program Models and metaheuristics for real-world problems in integrated logistics

beanTech IT moves your business — Integrated Logistics

ESTECO — PAR-FVG Process Management

DANIELI AUTOMATION — Steelmaking and Casting Planning and Scheduling

Ateikon® — Ready-mixed Concrete Delivery

PATAT 2016

To those interested

Thanks for your attention

I am available for questions, follow-ups, …