QUANTITATIVE Consulting

mediaresearch
A STEP AHEAD

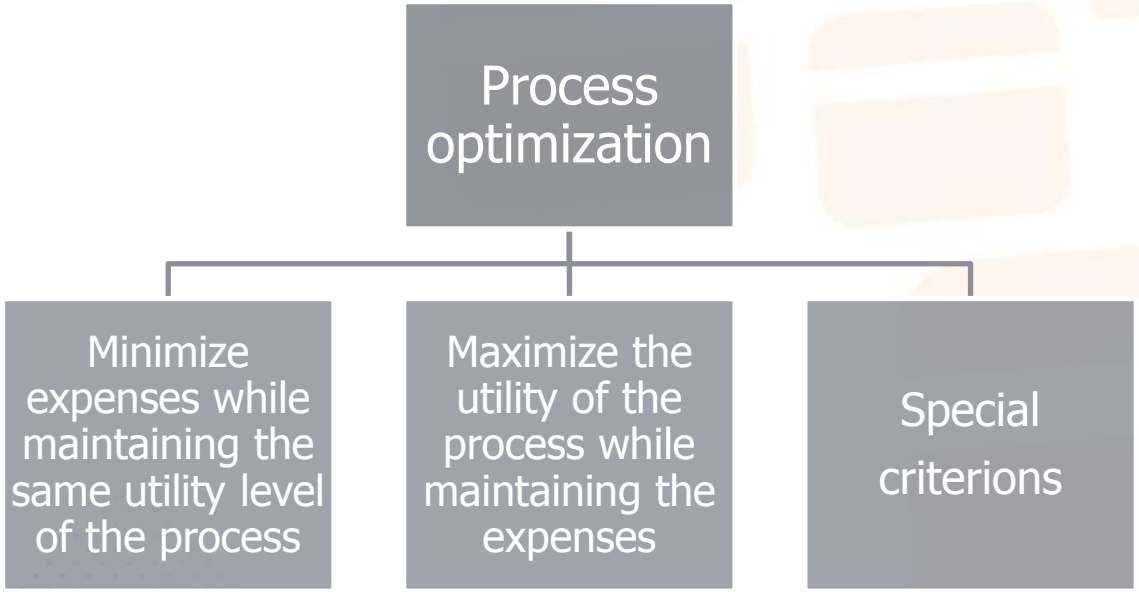
Management Process Optimization

One of the offered services

Achieve effective processes!

The **process** is **set of rules** that defines which procedures to apply based on the entry data **to achieve a goal**

Effective process is process achieved by **process optimization**



Utility of the process

=

Probability of the project being successful **or** measurement of how successful the process is

Special criterions

- Prioritize parts of the processes, that are important from business point of view
- Others

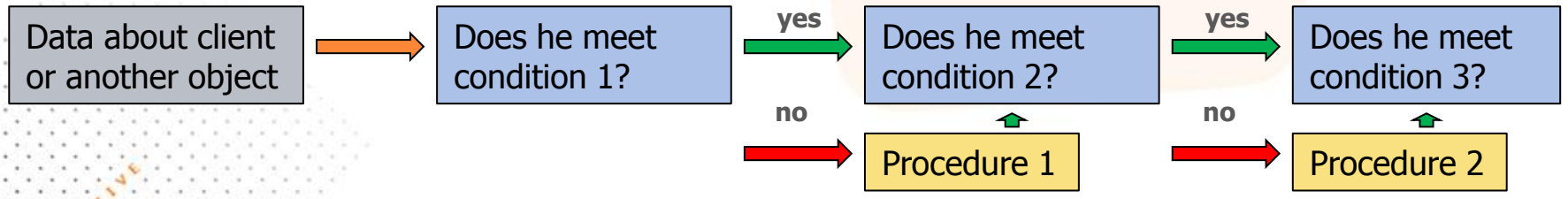
Where we can help you?

Particular examples of processes to be optimized

Marketing	Approval	Maintenance	Collection
• Approach potential clients • CHURN management	• Financial products • Applicants	• Communication with clients • Consolidation of loans	• Debt recovery

We focus on optimization of **processes** where **approach to** an individual or a group of **clients/objects is examined.**

The **rules** of the **process** are the **conditions** under which every **procedure is performed**

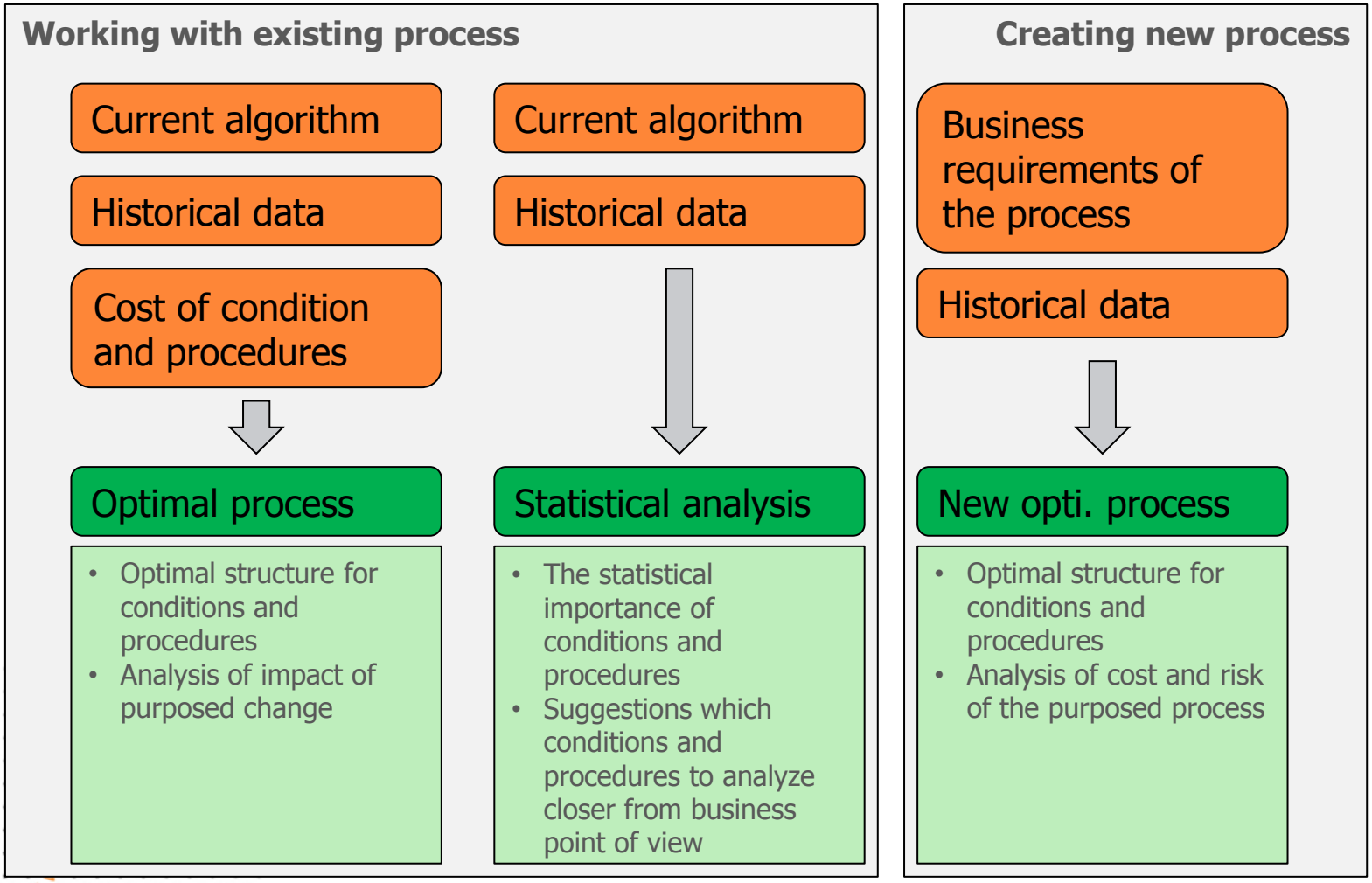


EXAMPLE – SIMPLIFIED LOAN APPROVAL PROCESS

conditions			procedures	price	outcome
Older then 55	No car	→	2 hour interview	32€	Fail/pass
Income <1000€	No flat	→	1 hour call interview	12€	Fail/pass
No children	Single	→	House visit	35€	Fail/pass
No degree	Single	→	Expert appreciation of object of loan	40€	Fail/pass
None of above		→	Standard 30 min interview	8€	Fail/pass

Process outcome = bad/good loan (0/1)

What do we need from you and what do you get



STATISTICAL ANALYSIS

Purpose	Methods
Identification of unnecessary conditions ▪ Similar conditions ▪ Diversification of procedure result based on condition	▪ Regression of procedure result on input variables (linear, logistic, nonlinear - depends on data) ▪ Additional criterions (Gini coefficient, correlation)
Change of conditions ▪ categorization of variables, make/alter margins ▪ Identification of missing variables which should be included	▪ Cluster analysis ▪ Decision trees ▪ Expert assessment ▪ Regression
Identification of unnecessary procedures	▪ Regression of process result on procedure results (linear, logistic) ▪ Additional criterions (Gini coefficient, correlation)
Change of structure of procedures	▪ Expert decisions based on causality analysis

What are our conclusions based on

OPTIMIZATION

Statistical analysis

Results of methods that measure the **roles** of **conditions** and **procedures**

Condition and procedure structure

Lowest expenses
Best results

How to compare results of different methods?

Assign weights to every method result

Analytical methods
X
Expert decision

Optimize with selected weights and prices

Optimization based on special criterion

Minimize expenses while maintaining process utility

Maximize the utility while maintaining the expenses

Linear, Non-linear, Robust, Stochastic or Multi-objective programming

ALTERNATIVE METHOD BASED ON RESPONSE SURFACE METHODOLOGY (RSM)

Let us demonstrate this method on a simple example of maintaining a client

abbreviations	
NH1	Num. of hours that operator of class 1 spend on a client (per year)
NH2	Num. of hours that operator of class 2 spend on a client (per year)
NL	Number of leaflet send to client per year
ND	Number of discounts client receives per year
S	Number of months the client stays with the bank

abbreviations	
P_{NH1}	Price of 1 hour of operator class 1
P_{NH2}	Price of 1 hour of operator class 2
P_{NL}	Price of one leaflet
P_{PD}	Price of one discount

The goal

To determine what is the optimal values of NH1 NH2, NL, ND and S

Assumption

We assume that we will receive the groups of clients such that in every group the parameters of NH1 NH2, NL, ND and S should be the same for all clients within the group

If the assumption is not met we will use methods of **discriminant analysis** to create needed groups

ALTERNATIVE METHOD BASED ON RESPONSE SURFACE METHODOLOGY (RSM)

For each group we go through next two steps

1. We estimate S using other parameters (for simplicity let's use linear regression)

$$S = \beta_0 + \beta_1 NH1 + \beta_2 NH2 + \beta_3 NL + \beta_4 ND + \varepsilon$$

2. We solve the optimization problem

$$\max_{NH1,NH2,NL,ND} (b_0 + b_1 NH1 + b_2 NH2 + b_3 NL + b_4 ND)$$

The "b"s are estimates of beta from step 1

Under conditions

$$P_{NH1} NH1 + P_{NH2} NH2 + P_{NL} NL + P_{NS} NS \leq P$$

$$NH1 + NH2 < A$$

$$NL < B$$

$$NH1, NH2, NL, ND \geq 0$$

P is the maximum price of the process. A and B are margins where more calls or leaflets will start to have negative effect on the outcome.

If the more appropriate regression was chosen there would be no need for restrictions with A and B

We have the desired optimal values of each parameter for each client group

EXAMPLE OF A PROJECT

Openning

- One of the major Czech financial institution wanted to analyze one part of their loan approval process

Assigment

- Statistically analyze importance of a given condition A
- If importance is low then suggest which other conditions can be left out from statistical point of view

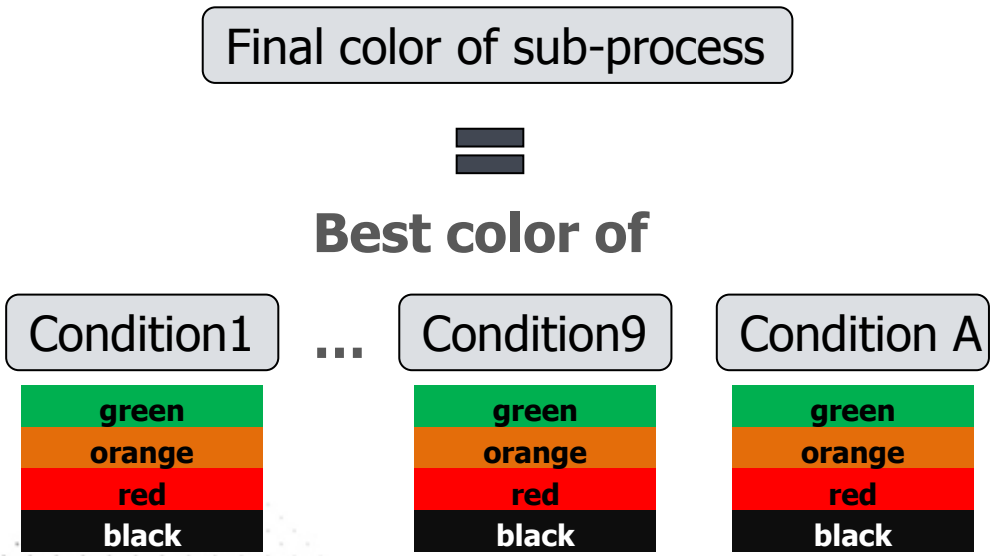
Received data

- All loans and applicants
- Which loans were approved and which of the approved loans defaulted
- Description of examined part of the approval process

Results

- 5 methods proved that the condition A was not important as required
- Using 6 methods it was suggested which condition to focus on when deciding which one of them to leave out
- See more detailed description of the problem and sample output on the next slides

THE GIVEN PART OF THE APPROVAL PROCESS (SUB-PROCESS)



The colors of conditions are depending on requirements that a client meets

The **procedures** that have to be undergone for each client are **based on** the **colors of the sub-process**. For example **black color** of the Sub-process means that the client has to undergo the **strictest procedures**

SAMPLE OUTPUT

Importance of Condition A		
frequencies of *Condition A colors*	green	83.13%
	orange	8.69%
	red	8.18%
	black	0.01%
A has the same color as color of sub-process		31.18%
% loans that would have better color of sub-process if we ignored *Condition A*		8.97%
Coefficient of *Condition A* when regressing sub-process color		0.495
Correlation between Condition A color and color of the sub-process		0.38

results of condition	Methods					
	Duplicity	% cases that have effect on sub-process color	Correlation with sub-process color	Regression coefficient	Gini coefficient	p-value default (log. reg.)
Condition 1	0	0.95%	0.160	0.389	0.001	0.500
Condition 2	0	5.52%	0.410	0.452	0.180	0.000
Condition 3	0	0.57%	0.200	0.628	0.001	0.500
Condition 4	0	0.04%	0.060	0.376	0.000	0.500
Condition 5	0	3.01%	0.260	0.430	0.002	0.500
Condition 6	0	1.86%	0.160	0.227	0.175	0.095
Condition 7	1	1.87%	0.090	0.094	0.158	0.060
Condition 8	0	1.60%	0.150	0.189	0.207	0.015
Condition 9	1	1.14%	0.170	0.389	0.053	0.000

Similar offered services

- Production process optimization
- Logistic optimization
- Portfolio management
- Risk management

For **complete list of our services** or any other query please do not hesitate to contact us at info@quantitative.cz or have a look at our website www.quantitative.cz.

A Step Ahead

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