Business process optimization – experiences of students' independent process examination in Institute of informatics, Maribor

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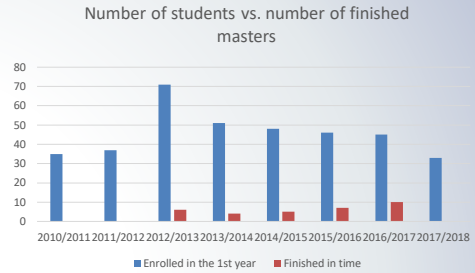
Agenda

- FACULTY/UNIVERSITY SURVEY RESULTS
- ASSISTANT SURVEY RESULTS
- SUBJECT'S SURVEY RESULTS
- STUDENTS SUCCESS/ATTITUDE RESULTS
- CONCLUSION AND FUTURE PLANS

General success of students at Institute of Informatics (FERI)



	2010/ 2011	2011/ 2012	2012/ 2013	2013/ 2014	2014/ 2015	2015/ 2016	2016/ 2017	2017/ 2018
Enrolled in the 1st year	35	37	71	51	48	46	45	33
Finished their studies in time	No data provided	No data provided	6	4	5	7	10	No data provided
Success rate			**8%**	**8%**	**10%**	**15%**	**22%**	

[**Student Affairs Office**]

Students surveys

	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016
Student survey (FERI) – average grade [-2,2]	1,13	1,15	1,11	1,12	1,14	1,16
Student survey (UM) – average grade [-2,2]				1,23	1,27	1,3
				15/17	**16/17**	**15/17**

2016/2017 – results not representable due to technical issues
2017/2018 – final results not yet available

Students surveys – personal evaluation

2009/2010	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017
1,54	1,33	1,15	1,33	1,3	1,4	1,02	1,4

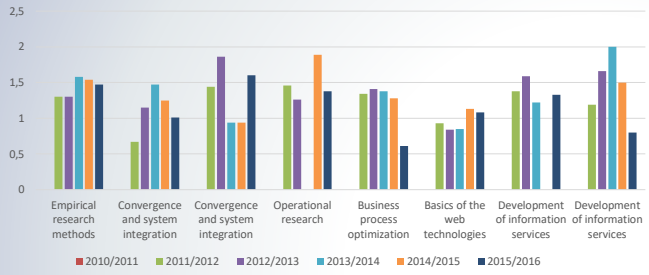
Surveys are accompanied by student‘s comments:

- The assistant talks to fast
- The feedback is too slow
- The labs are not according to lectures
- Not enough literature is provided
- Too much focus on the tool
- Too simple „hello world type“ examples
- ….

Students surveys – subjects evaluation

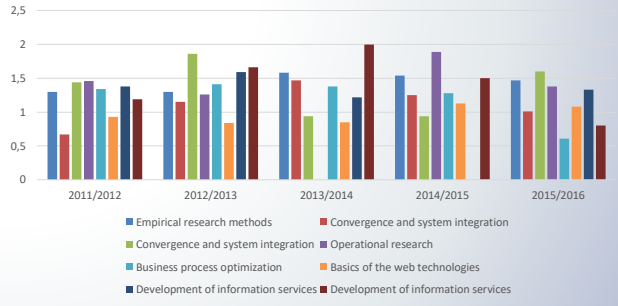
	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016
Empirical research methods		1,3	1,3	1,58	1,54	1,47
Convergence and system integration		0,67	1,15	1,47	1,25	1,01
Convergence and system integration		1,44	1,86	0,94	0,94	1,60
Operational research		1,46	1,26		1,89	1,38
Business process optimization		1,34	1,41	1,38	1,28	0,61
Basics of the web technologies		0,93	0,84	0,85	1,13	1,08
Development of information services		1,38	1,59	1,22		1,33
Development of information services		1,19	1,66	2,00	1,50	0,80
Practicum I		1,47			1,32	
Tools for application development				1,30		
Practicum III		0,9	1,19			
Practicum III		1,72	1,79			
Practicum II		0,99				
Practicum II		1,14				

The subject‘s dynamics



Main subjects evaluation

Dynamics through the years



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Students survey: Business process optimization

Motivated to evaluate, what CAN GO wrong!

CHANGE #1
Introduction of real-life motivation for optimization

- Managing increasing complexity of business processes
- Reacting to strategic change due to digital transformation / data law regulations
- Trying to be up to date by continuous measurement and improvement
- Taking all possible steps (methods) to improve/simplify processes

CHANGE #2
Challenging the use of existing approaches

- Using modeling techniques (BPMN, UML, BPEL, XSD)
- Focusing on implementation of the modeled process (IBM WebSphere)
- Focusing on the tool rather than the process
- Computerization/automation above the process examination/understanding

- Introduction of a holistic „**content oriented**“ approach with several possible methods
- The students had more **freedom** when choosing their projects.

CHANGE #3
Introduced methods/approaches

- Modeling
- Detailed analysis based on Activity Analysis Worksheet
- Key Performance Indicators definition
- The Lean Six Sigma approach
- The Root Cause Analysis
- The AS-IS / TO-BE concept
- Revision
- Simulation
- *Linear programming for maximum profit/minimal cost calculation based on defined KPI‘s*
- *Sensitivity analysis*
- …

To be able to analyze process characteristics properly, we have to document them, model them, if possible simulate them and evaluate possible alternative scenarios.

Leaded exercises (with three focused quizzes)

- Finding the process (smart home, smart city, production processes, business processes….)
- Description of the activity characteristics, indicators of success
- Modeling
- Process simulations
- Definition of risks, burdens, imbalances
- Root cause analysis (Fish bone diagram)
- TO-BE process construction
- Revision by fellow students
- Analysis/presentation of results

DATA GATHERING

IMITATION OF REALITY

DESCRIPTIVE ANALYSIS

ADJUSTMENTS MARKETING

SEVERAL FOCUS AREAS

Definition of Key Performance Indicators

- Metric system in measuring process quality
  - based on the identified risks and possible/expected problems
  - defined to help measure the success or effectiveness of the process
- Usually numerical values such as time, cost, profit, number of complaints, number of rejections.

The Lean Six Sigma approach

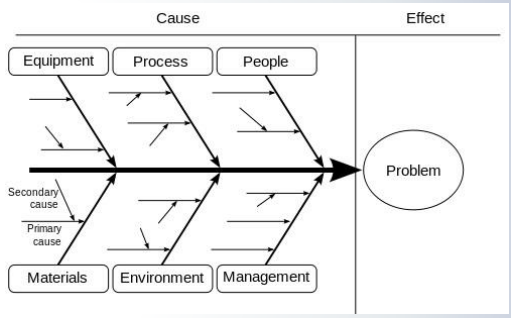
- Improving the process through combination of Lean management and Six Sigma
  - a set of principles that aim to improve efficiency based on improvement strategy from manufacturing and other industry
  - systematically removing waste and reducing variation
- It includes:
  - wastes identification
  - Identification of loads, imbalances and potential bottlenecks
  - Identification of non-added value activities

(1) **Defects** - products or services that do not meet the specifications
(2) **Overproduction** - overproduction over the possibility of selling
(3) **Waiting** - for the previous activity to end
(4) **Non-utilised talent** - employees who are not involved in the process effectively
(5) **Transportation** - transfer of items or information that are not necessary for execution
(6) **Inventory** - sources or information that are not used in the process
(7) **Motion** - unnecessary movement of people, information or equipment due to inadequate position or storage
(8) **Extra processing** - performing activities that are not necessary for the performance of the required product or service.

Wastes - activities without any added value

The Root Cause Analysis

- A method of problem solving used for identifying the root causes of defects or problems in a process
- The problem is often based on past **identified risks** or **simulation** results. The analysis is conducted by using the following steps:
  - Identification of (potential) problems
  - Creation of a causal diagram (Ishikawa or a bone diagram)
  - A 5-why approach is used to find the cause



Simulation

- Imitation of the real process, supported by a tool (Signavio)
  - of the original process (**AS IS** in present state)
  - of the renewed process (**TO BE** after optimization)
- Provides data:
  - To compare wether the changes will provide positive influence:
  - To identify weaknesses, wastes, bottlenecks and possible options for improvement.

A STUDENT‘s PROJECT EXAMPLE

- OBJECTIVE: analyze and optimize process of student‘s choice

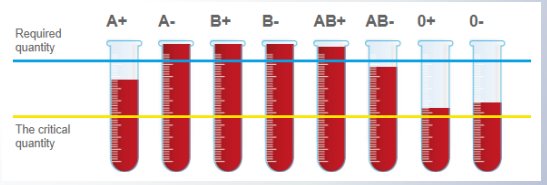
- The smart city domain was largely analyzed

- A (simplified) process of blood donation from the health domain

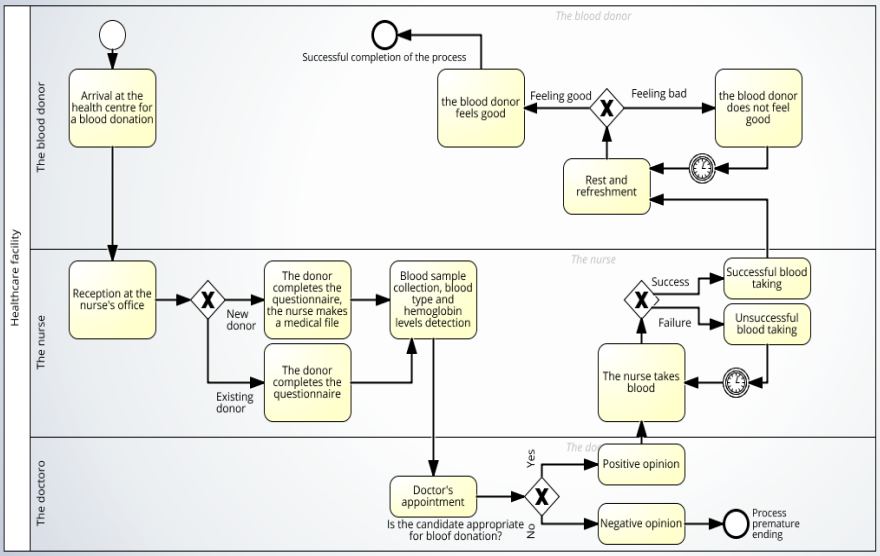
List of activities

- Sending an invitation to the blood donors
- Treatment of a new blood donor
- Conducting a questionnaire
- Taking and testing the blood
- Writing a report
- Examination by a doctor
- Deciding if the candidate can be a blood donor or not
- Discharging the donor
- Collecting the blood
- Sampling the blood
- Treating the donor
- …

Zavod Republike Slovenije za transfuzijsko medicino
Blood Transfusion Centre of Slovenia



THE CASE STUDY MODEL



Understanding of a process is followed by 4 analysis steps

Step 1 – The MANAGMENT APPROACH

List of KPI's in the analysed process

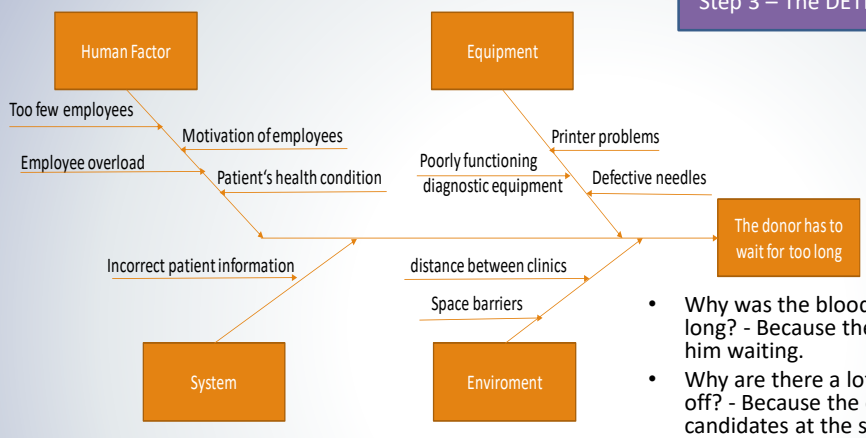
Indicator	State of success	State of failure	Performance measurement
Time (t) to implement the entire process	t < 60 minutes	t > 80 minutes	Record the time from the beginning of the treatment and to the end
Time of entering information about the donor on the computer (Nurse)	15 min / blood donor	30 min / blood donor	Measurement of venous blood donors
Percentage of successful (selected) blood donors	0%	More than 5%	Measuring how many candidates were not appropriate and therefore rejected
Record how many needle inserts are needed when taking blood	1 needle insert / blood donor	2 needle inserts or more …	Measuring the effectiveness of the blood removal, number of needed needle sticks
Percentage of accepted blood donors	100%	Less than 70%	Measuring how many candidates were taken to the blood donors
The percentage of new donors received by invitations	100%	Less than 50%	Measurement of how many new blood donors have been obtained with the sent invitation
The cost of taking blood	20 EUR / blood donor	Costs are greater than EUR 40 / donor	Measuring the number of blood events
The time needed to see the donor	15min/blood donor	30min/blood donor	Measuring the examination time of blood donors

Step 2 – The PRODUCTION LINE APPROACH

Defined wastes in the analysed process

Waste	Risk placement in the process	Proposal solution
Waiting	Occasionally there is congestion because the doctor is overloaded	Additional doctor work, and job sharing.
Defects	Occasionally, unsuccessful withdrawal of blood from candidates may occur	Repeating blood retrieval after a few minutes Review the equipment
Non-utilised talent	Absence of a reference nurse	A reference nurse could take over tasks from a doctor
Motion	The patient must move from one office to another	Ordinations should be positioned close together, which would reduce the movement and waste of time
Waiting	Occasionally there are congestions because the nurse is overloaded and fails to process all data when entering the PC	Employment of an additional nurse and division of works.
Non-utilised talent	Unused young doctor	Reduced norm for 17min, hour price 30 €

Step 3 – The DETECTIVE INVESTIGATION APPROACH

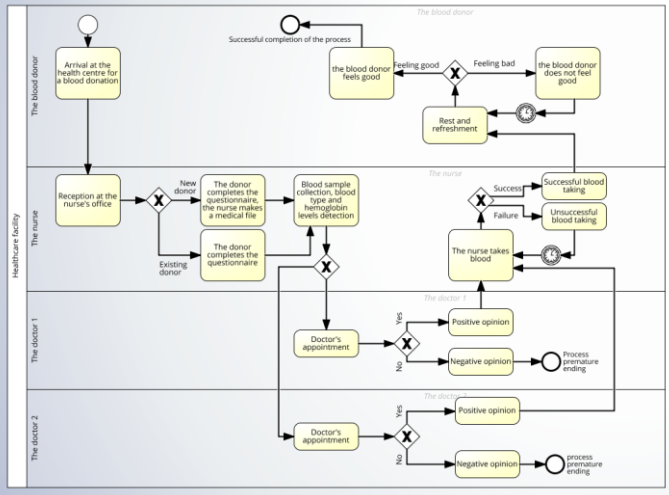


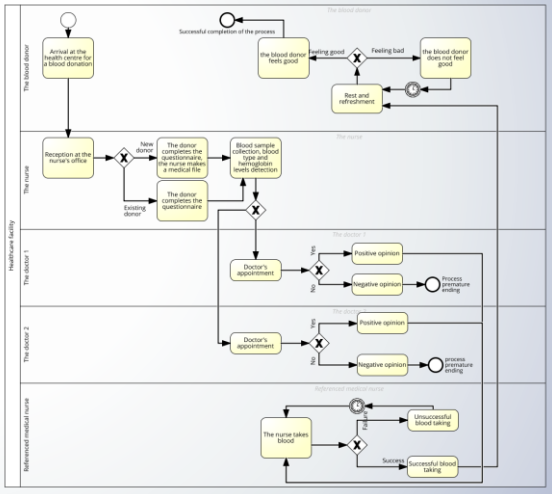
The root cause analysis

- Why was the blood donor waiting for blood too long? - Because there are more people ahead of him waiting.
- Why are there a lot of others waiting for the take-off? - Because the doctor cannot examine so many candidates at the same time.
- Why can a doctor not examine so many candidates? - Because he is overloaded.
- Why is the doctor overloaded? - Because it works more than the norm for one doctor.
- Why does it work more than the norm for one? - Because the health institution did not employ an additional doctor.

Simulation of the TO-BE versions

Step 4 – The ITERATIVE IMPROVEMENT APPROACH





AS-IS and TO-BE comparison

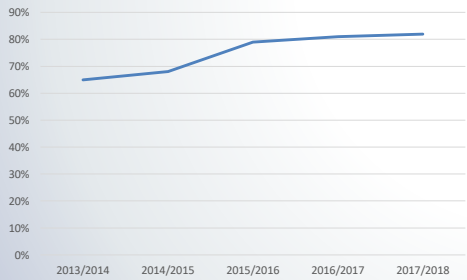
		One Case - negative	One Case - positive	Multiple cases (20 instances per week)	Multiple cases (40 instances per week)
AS-IS	Costs	66,67€	76,67€	1740,67€	32870,50€
	Cycle time	1:05 h	1:05 h	1d 15:15 h	11d 05:55h
	Bottlenecks	no	no	no	The Doctor
TO-BE – v1	Costs	59,17€	69,17€	1549,17€	2985,50€
	Cycle time	1:05 h	1:05 h	3d 19:50 h	10d 18:30h
	Bottlenecks	no	no	The nurse	The Doctor1
TO-BE – v2	Costs	64,17€	76,67€	1344,17€	2838,33€
	Cycle time	1:05 h	1:10 h	1d 00:20 h	4d 16:30h
	Bottlenecks	no	no	no	no

CONCLUSION

- Through simulation the students are able to numerically evaluate the influence of their changes
- Through descriptive methods the students are able to understand the process and its characteristics better
  - identify bottlenecks
  - identify wastes
  - understand the core of the problem
- Through choosing their own assignments they are more responsible towards achieving a good result

Students grades developement

	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018
Average grade	65%	68%	79%	81%	82%



Student‘s comments:

- The initially simple process turns out more complex and harder to optimize as thought earlier
- Most KPI‘s are hard to obtain (most of them are not numerical
- It‘s hard to predict the long-term influence of the changed process
- Not all KPI‘s can be improved

Future work

Addressing the setbacks:

1. Difficulties to understand and gain enough data about an non IT processes (from an IT perspective)
2. Limitation to transform the real-life process in a simulation environment
3. Choose the right view on the problem (as the customer sees it)
4. Provide solutions not new problems
5. Use appropriate method within context

Thank you for listening!

Questions?

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