Ishikawa fishbone diagram

Skorkovský ESF MU KPH

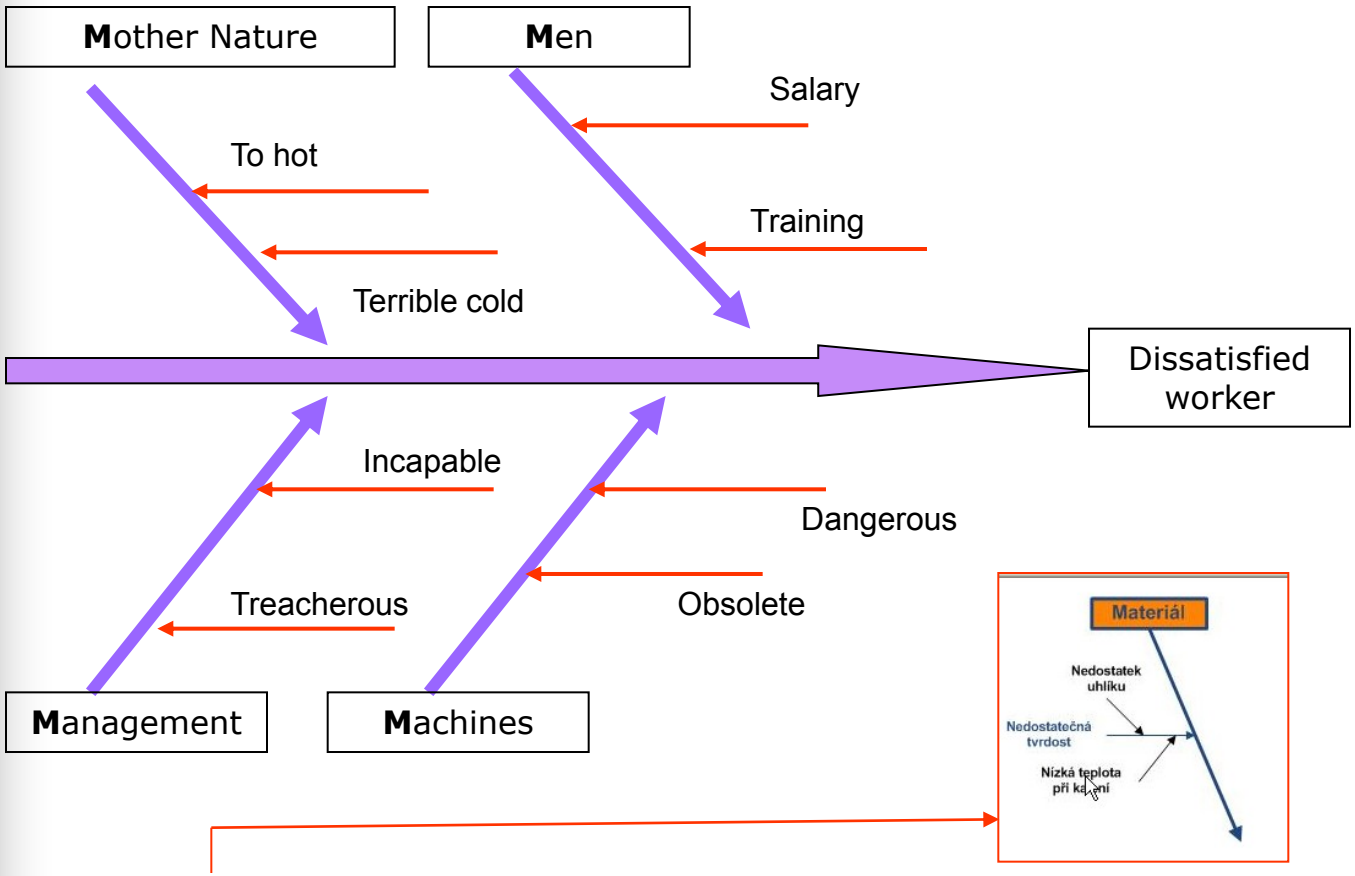
Introduction (FBD= fishbone diagram)

- FDB is a tool to find out relationships:

Cause → Effect

- Use in QM especially in automotive industry
- On of the tool set used to create so called 8D report (8 disciplines=FBD+5WHYs+PA+QM)
- Another tool : 5 WHYs – will be cleared later
  Another tool : PARETO=PA analysis will be shown later

Fishbone diagram



(Methods, Material, Manpower, Measurement, Machines, Mother Nature,Management)

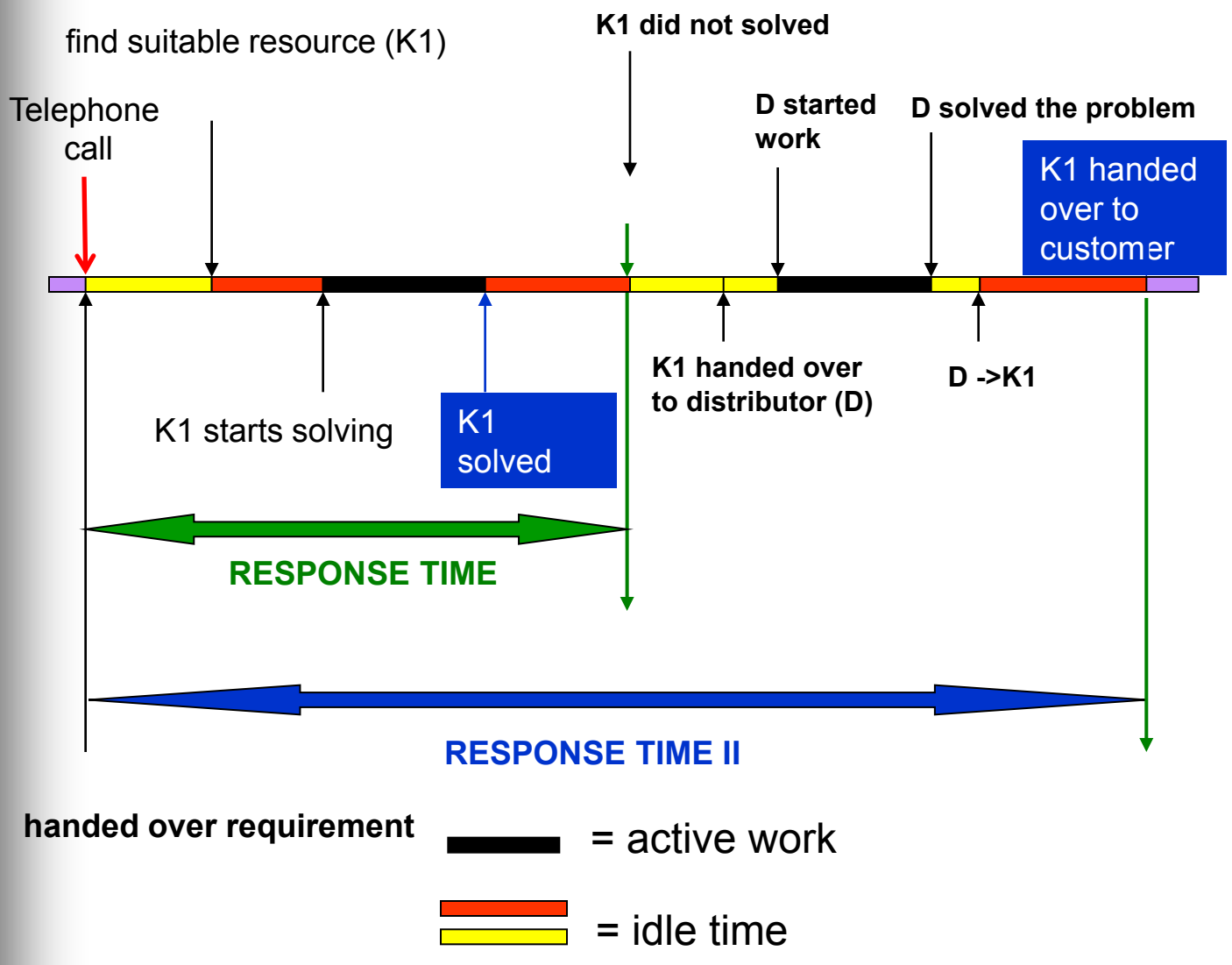
Some chosen problems which could be find out during ERP support process I

- long response time to requirements
- requirement is directed to unsuitable consultant
- bad documentation about service action (poor log)
- people ask repeatedly same questions at different moments and different consultants are asked
- solution of disputes :complaint- standard service
- payment asked for supplied services
    1. how much (to whom, type of task, type of the error- see diagram
    2. starting time for invoiced services, response time
        1. requirement is handed over till the problem is solved
        2. time of starting solving -solved
        3. start of implementaion of the bad object till end of testing
        4. training

Some chosen problems which could be find out during ERP support process II

- bad training methodology
- bad consultants
- bad communication protocol
  1. telephone
  2. e-mail
  3. SKYPE
- lack of interest of the management of both parties
- right specification of reaction time
- specification to the error types and related response times
- response time of the distributor (ERP integrator ERP)

Diagram – response time



handed over requirement

= active work

= idle time

Fishbone diagram-support

heart of the problem

Mother Nature

Men

Good weather

Bad weather

Bad training

HR have a bad recruitment policy

Lower quality of the consultants

Consultant takes holiday

Phlegmatic person reacts later than expected

Consultant is on sick leave

Dissatisfied customer

Incapable

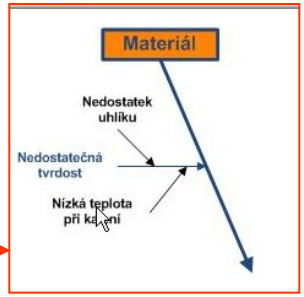
Bad communication

Interest in golf only

Bad SW for support (HELP DESK)

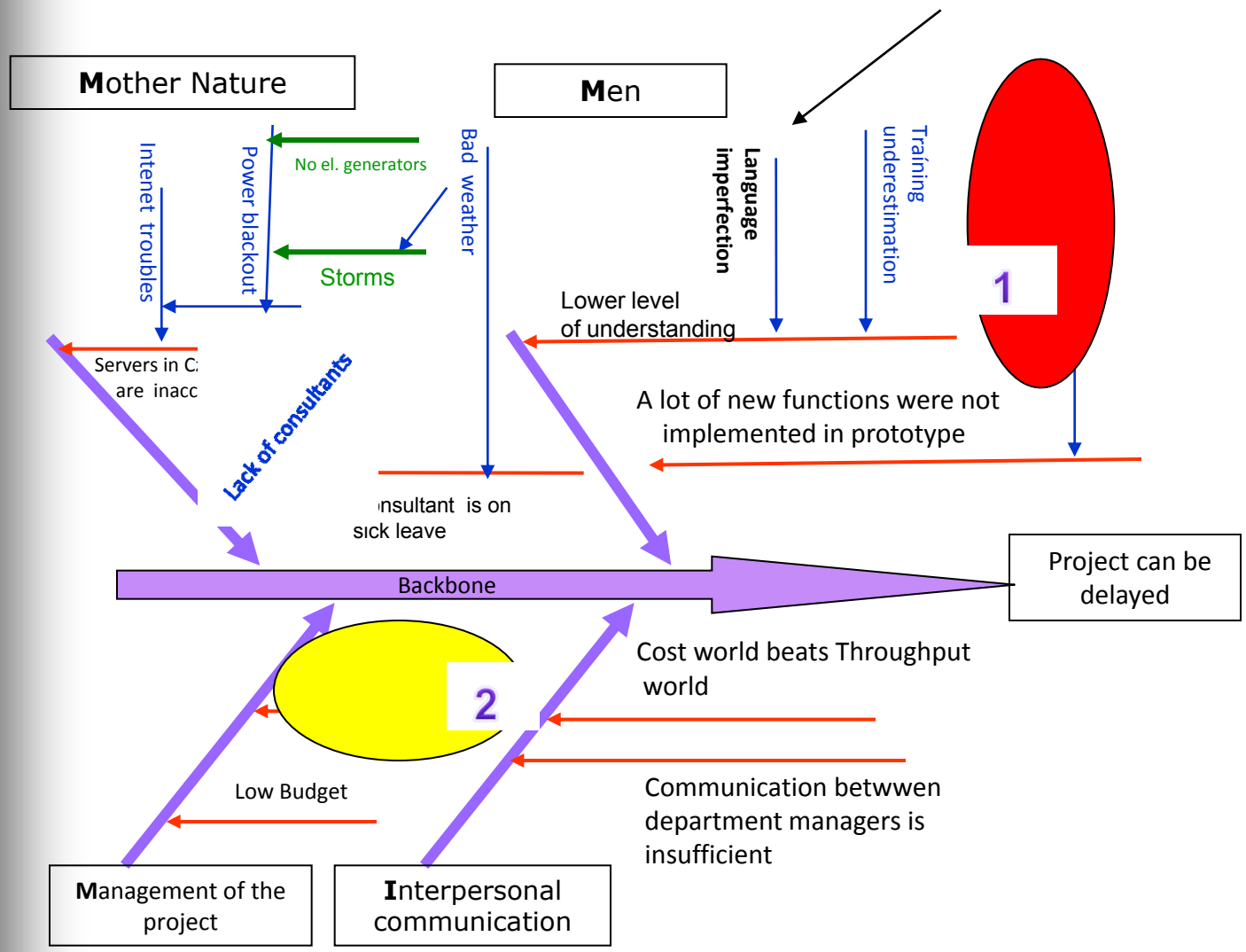
Management

Machines



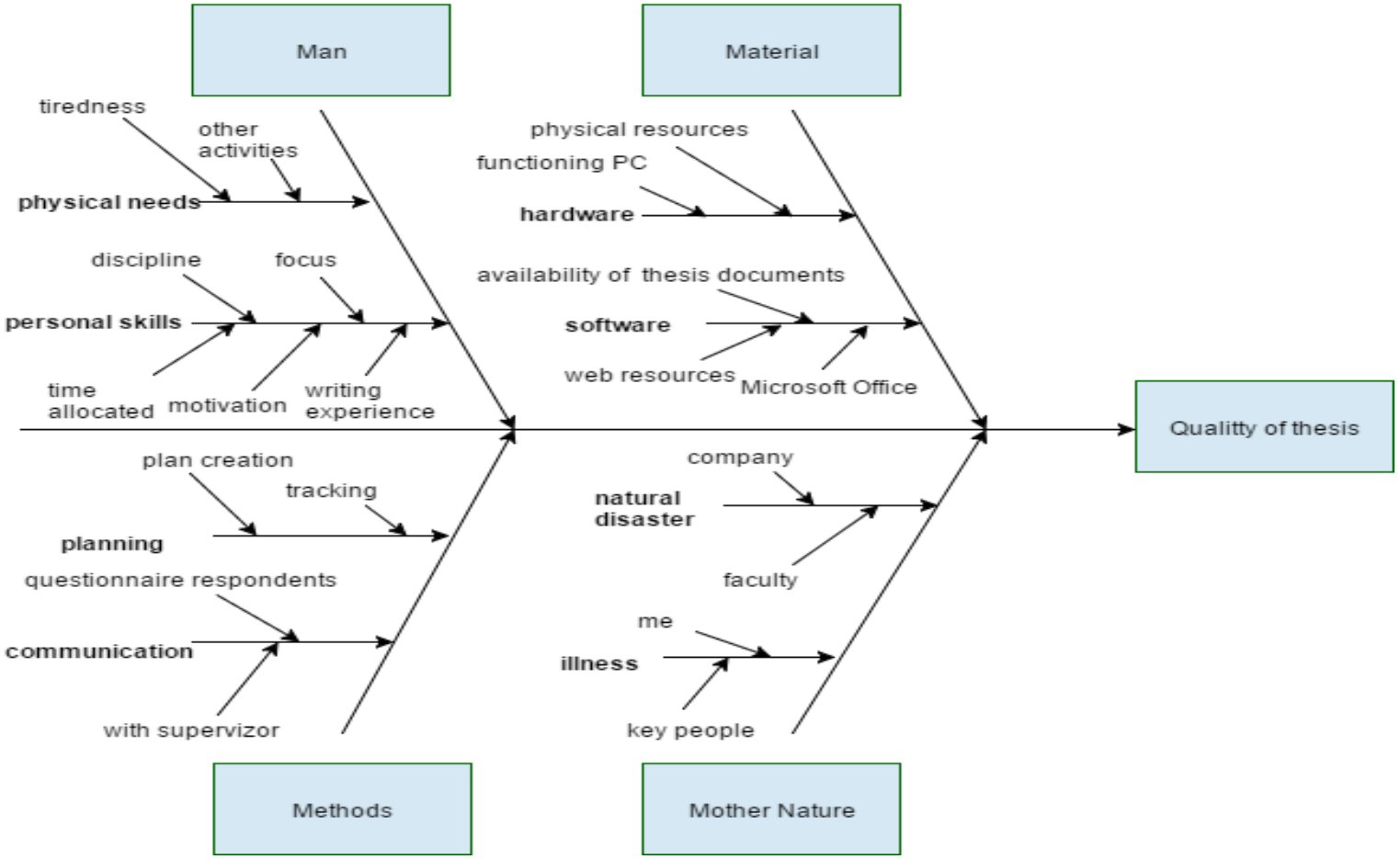
(Methods, Material, Manpower, Measurement, Machines)

Fishbone diagram-SA Project



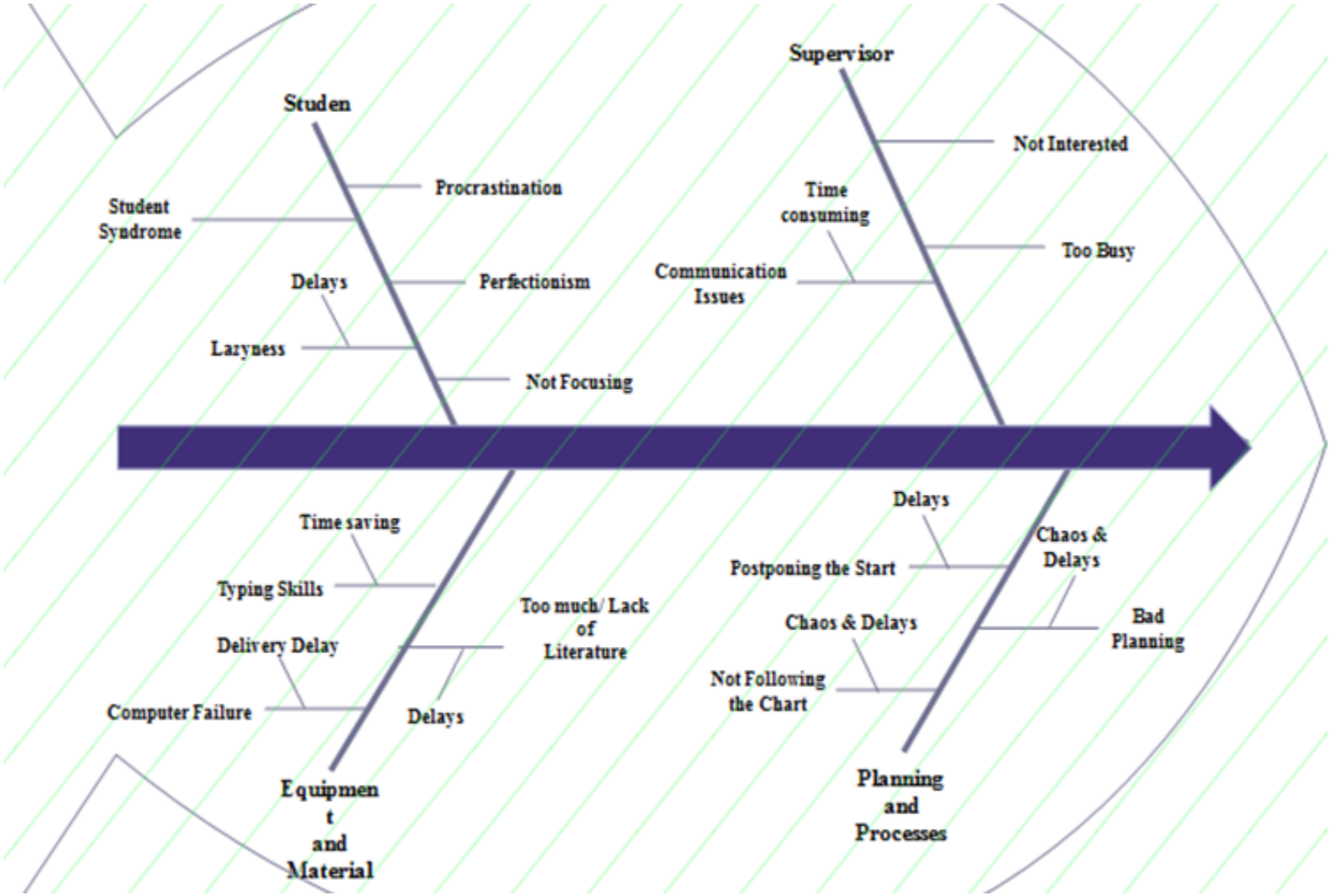
(Methods, Material, Manpower, Measurement, Machines)

Another example of Ishikawa I.

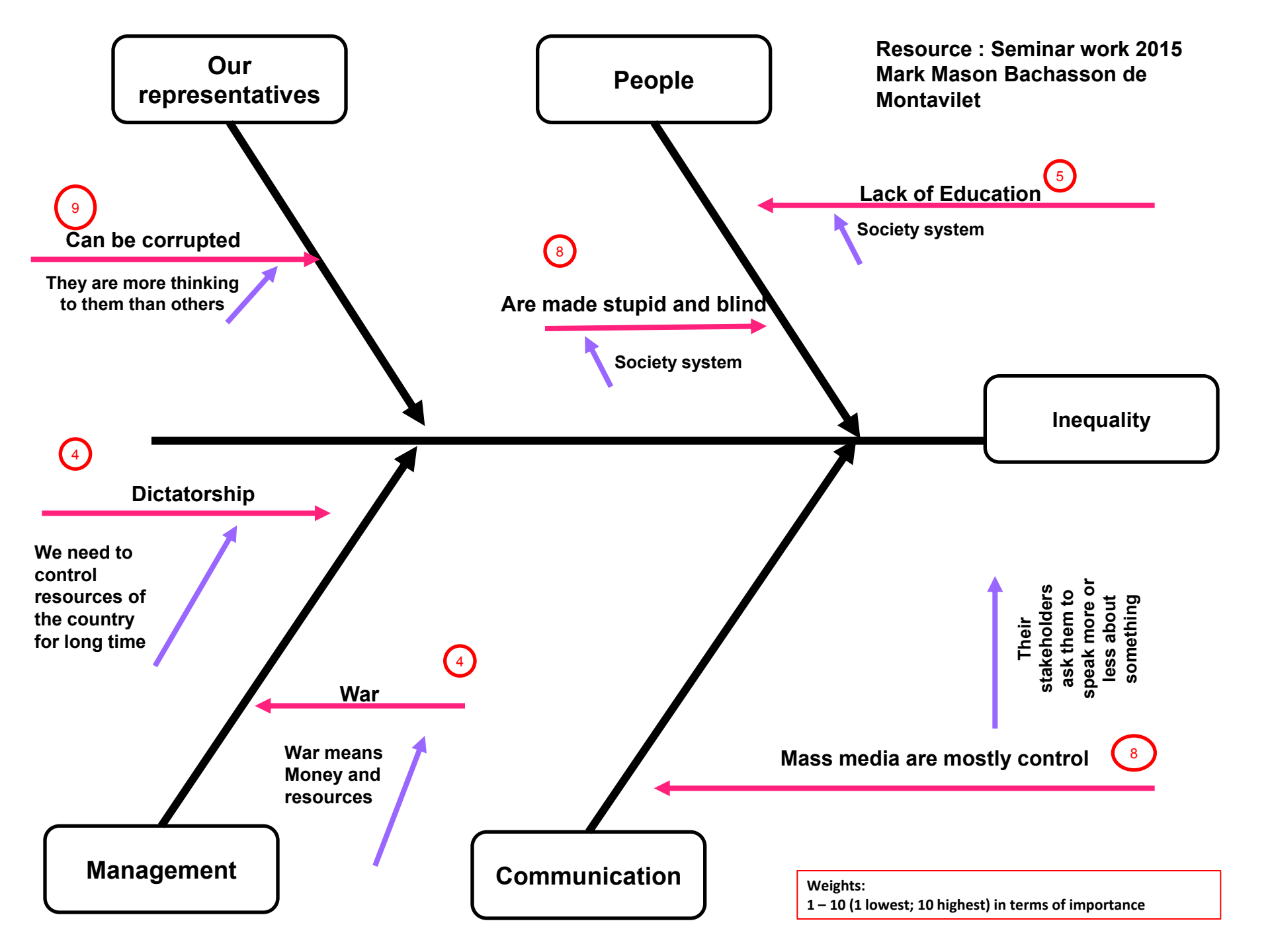


Resource : Seminar work 2015- Ing. Martin Lofaj

Another example of Ishikawa II.

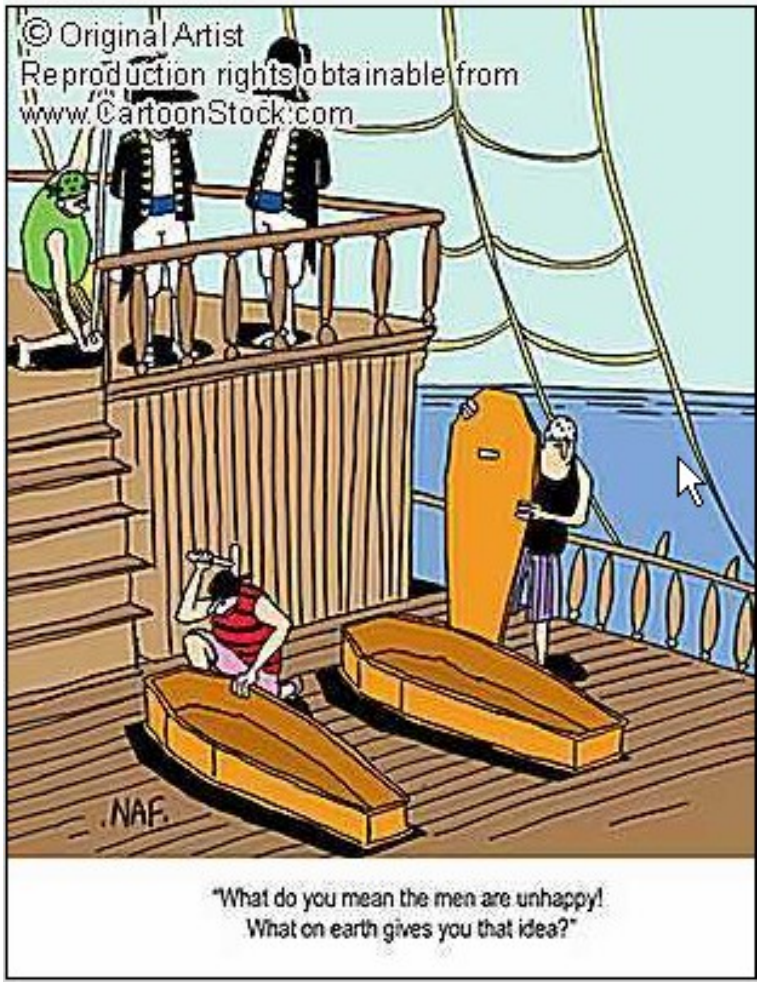


Resource : Seminar work 2015- Tugulea Lilia


Resource : Seminar work 2015
Mark Mason Bachasson de Montavilet
Our representatives
People
Inequality
Management
Communication
9
Can be corrupted
They are more thinking to them than others
8
Are made stupid and blind
Society system
5
Lack of Education
Society system
4
Dictatorship
We need to control resources of the country for long time
4
War
War means Money and resources
Their stakeholders ask them to speak more or less about something
Mass media are mostly control
8
Weights:
1 – 10 (1 lowest; 10 highest) in terms of importance

Dissatisfied employee I

Dissatisfied employee II



5WHYs

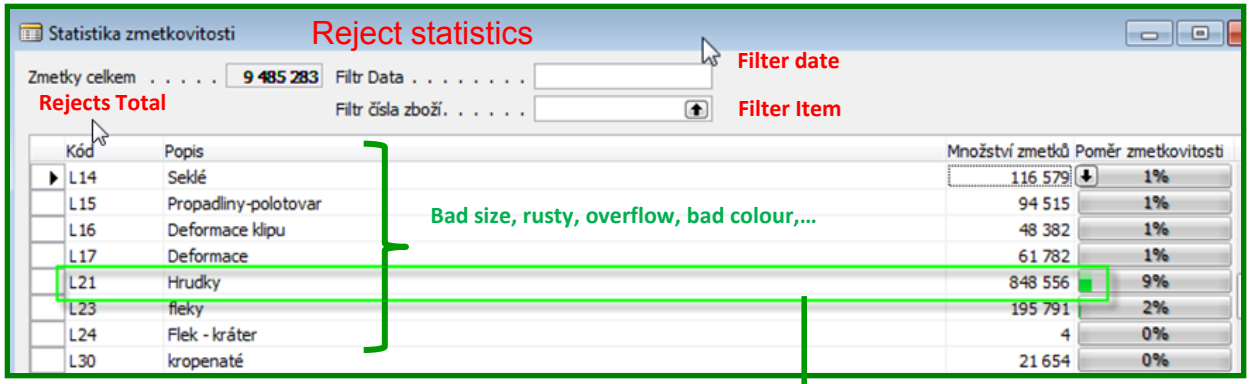
- WHY 1 :Why my car had stopped ?
- No petrol in tank
- WHY 2 :Why i did not have a petrol in my tank ?
- I did not buy in the morning on my way to work
  WHY 3 :Why i did not buy a petrol ?
- No money in my pockets
- WHY 4 : Why no money i my pockets?
- Evening poker
- WHY 5 : Why i did not win a poker game?
- I do not know how to bluff!

5WHYs

Cause

Effect

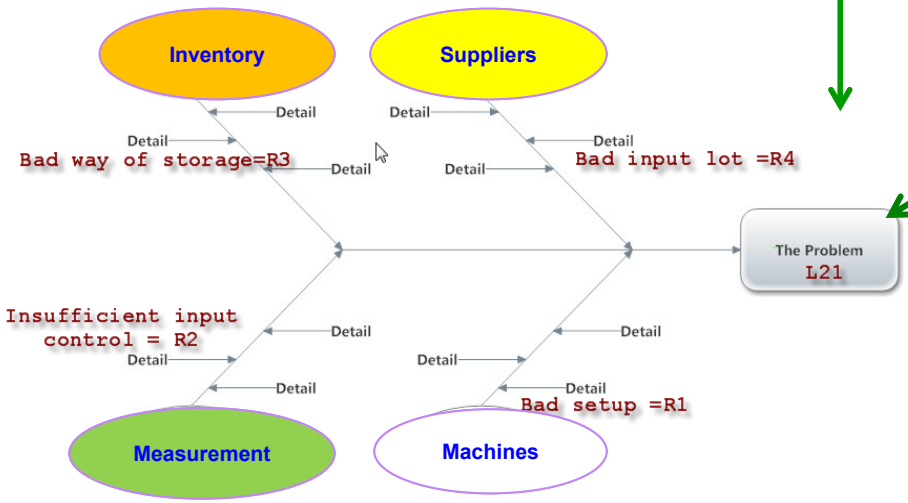
TQM and Ishikawa FBD and Pareto 80|20



- Reject statistics
- Final product /Rejects
- MachineCenters/Rejects
- Rejects in time
- Final products/Rejects in time
- Machine centers/Rejects in time

Reject type (effects);	Reason 1 (cause)	Reason 2 (cause)	Reason 3 (cause)	Reason 4 (cause)
L19	8	**9**	2	4
L20	0	1	4	**6**
L21	**7**	2	3	5

Score



Manual for urgent reject cause elimination

(to establish correct priority of remedy actions)

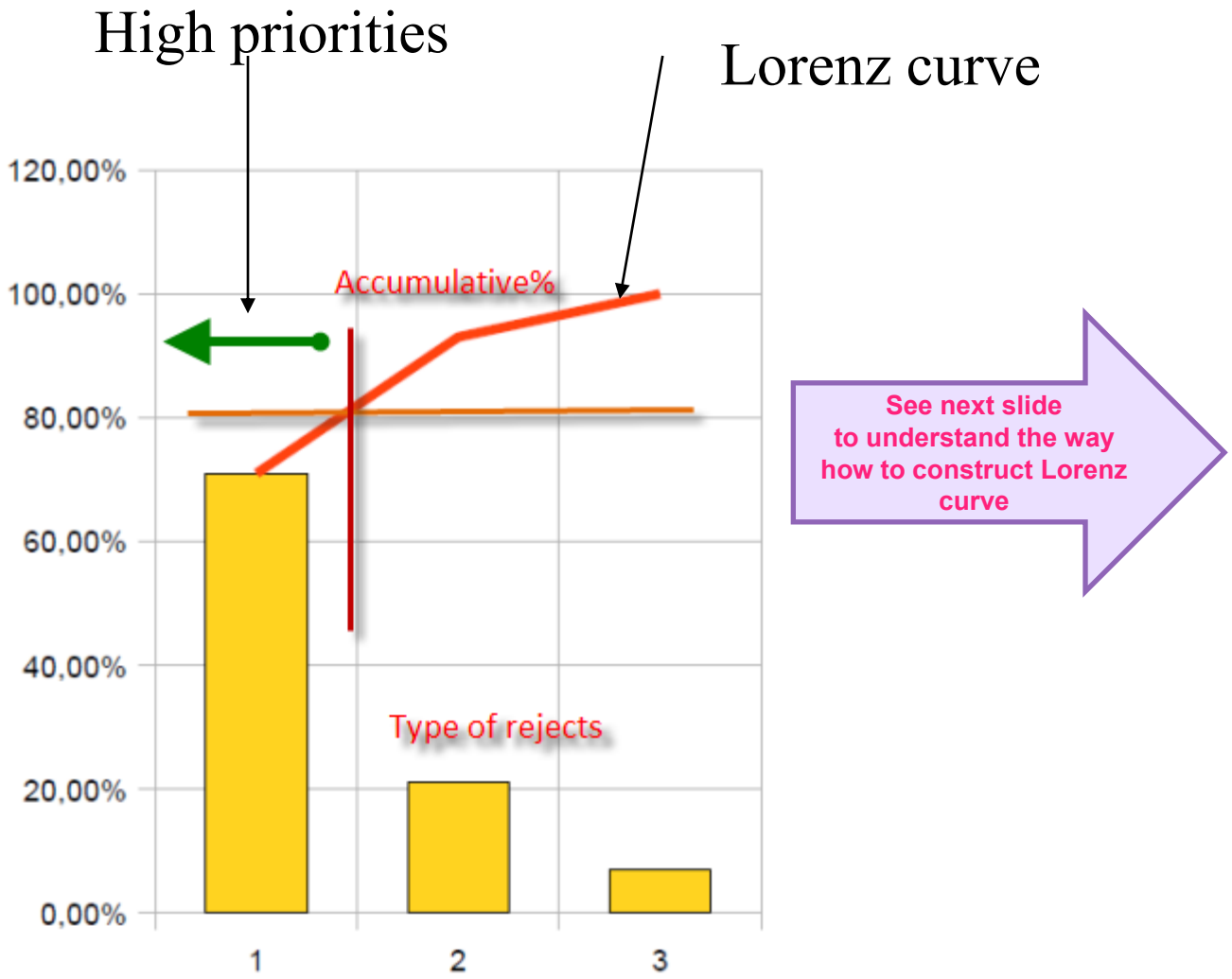
Every reject type ->one Ishikawa diagram (electronic version)

Pareto tool : What is it ?

- tool to specify priorities
- which job have to be done earlier than the others
- which rejects must be solved firstly

- which product gives us the biggest revenues
- 80|20 rule

Pareto chart : possibility to split up reject and setup priorities



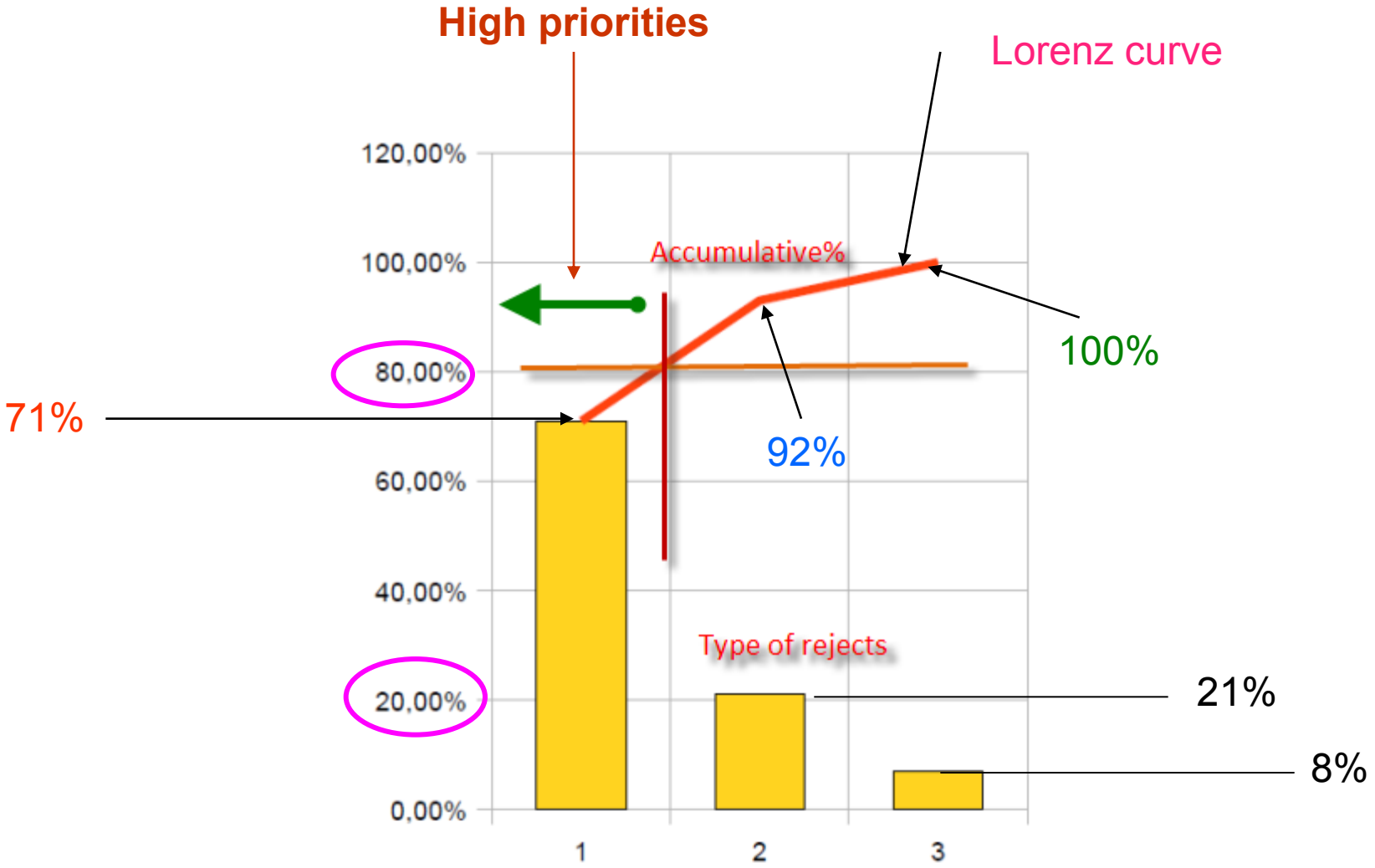
How to construct Lorenz Curve and Pareto chart

- list of causes (type of rejects) in %
- table where the most frequent cause is always on the left side of the graph

Reject	Type	Importance	Importance (%)	Accumulative (%)
1	Bad size	10	71%	71 %=71%
2	Bad material	3	21 %	92%=71%+21%
3	Rust	1	8%	100 %=92%+8%

Comment 1 : 10+3+1=14
Comment 2 : 71 % = 10/14; 21%=3/14 …..

Pareto chart- possibility to split up reject and setup priorities



Pareto analysis per every type of reject – next step ->practical example of Pareto use in ERP MS Dynamics NAV

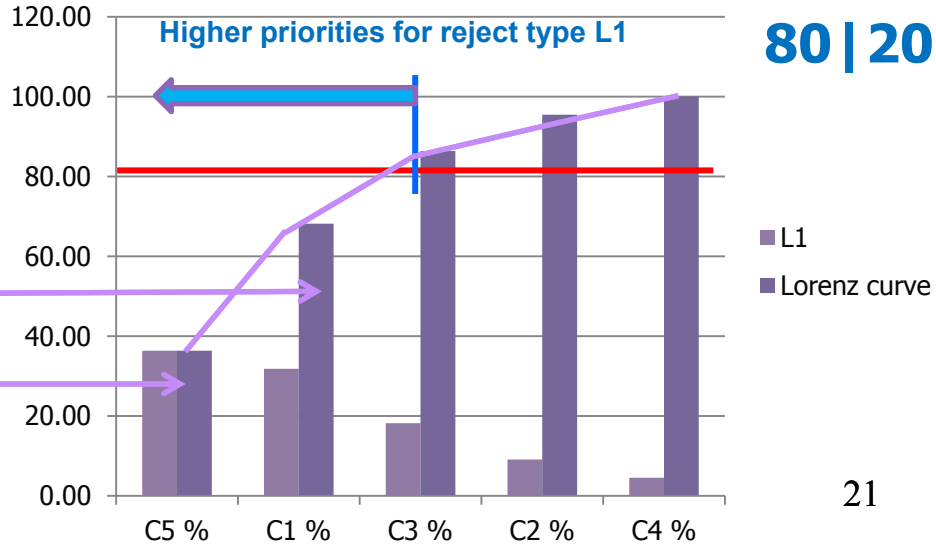
Type of reject	Cause 1	Cause 2	Cause 3	Cause 4	Cause 5	Cause 6	Total
L1	7	2	4	1	8	0	22
L2	2	4	6	8	0	9	29
L3	4	0	0	5	6	7	22
L4	5	7	2	0	1	3	18
L5	0	2	7	3	0	1	13
L6	9	7	5	2	3	6	32
L7	0	7	0	2	3	4	16
L8	1	8	6	2	4	0	21
L9	2	0	5	7	1	4	19
L10	7	2	8	9	7	5	38
C	C5 %	C1 %	C3 %	C2 %	C4 %	C6%	
L1	36,36	31,82	18,18	9,09	4,55	0,00	100
Lorenz curve	36,36	68,18	86,36	95,45	100,00		

C5	**8**	**36,36**	=(8/22
C1	7	31,82	=(7/22)
C3	4	18,18	=(4/22)
C2	2	9,09	=(2/22)
C4	2	4,55	=(2/22)

We need to improve (remedy) firstly causes C5 a C1 !!!

36,36 + 31,82

36,36



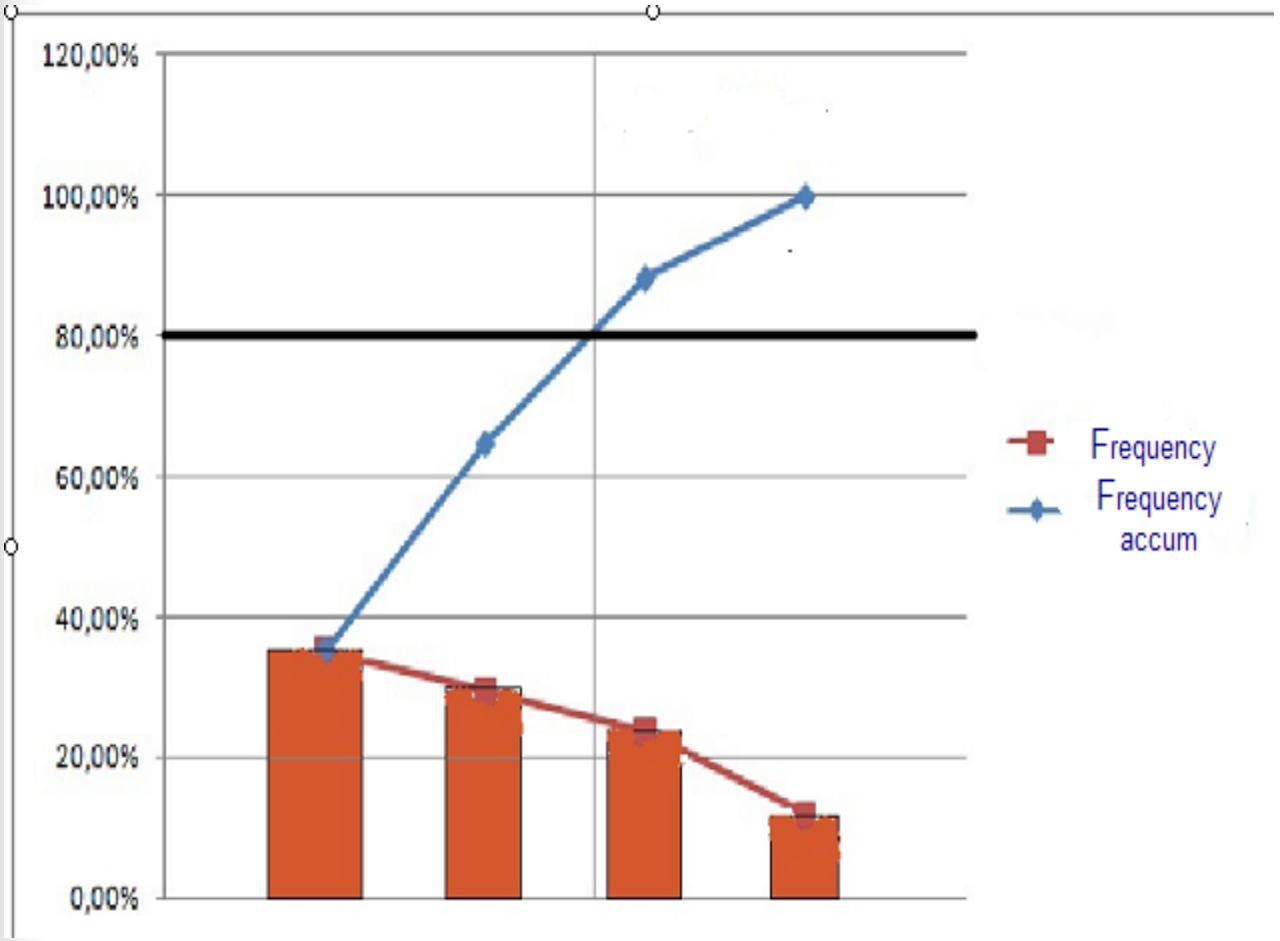
80 | 20

Pareto analysis II - data

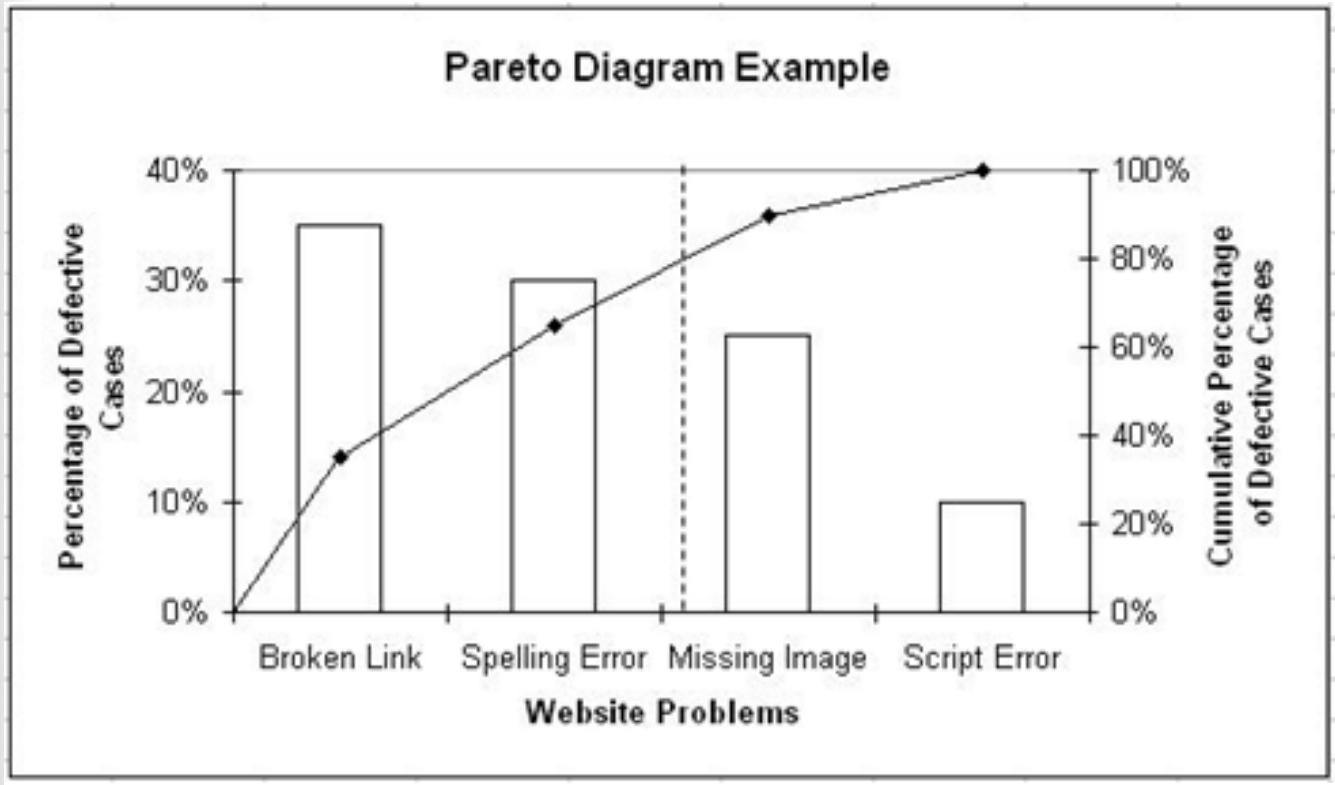
- Difficulty
- Resignation
- Underestimation
- Low motivation

Frequency	Freq (%)	Freq accum(%)
6	(35,29)	(35,29)
5	(29,41)	(64,71)
4	(23,53)	(88,24)
2	(11,76)	(100,00)

Pareto analysis II



Pareto analysis II



Evaluation of set of rejects

- Every reject is assigned to one Ishikawa tree
- Every tree with empty table is handed over to chosen company of responsible experts
- All tables are collected and evaluated
- See example with two rejects and two experts

	Domain	Machines	Input control	Setup	Routing	Method	Breakdowns	Workers	Measurment
	Reject code								
	L1	3,5	9	6,5	2	2,5	6	3	1,5
	L2	9,5	2,5	2	5,5	6	8	3,5	2,5
Expert	Reject								
John	L1	3	8	9	3	2	7	2	1
Linda	L1	4	10	4	1	3	5	4	2
Expert	Reject								
John	L2	9	3	3	5	7	8	4	3
Linda	L2	10	2	1	6	5	8	3	2

Current Reality Tree and Ishikava (Pareto)

12 Customer is unhappy

11 Project is late and overspend budget

10 Tasks are delayed

9 Bad multitasking

6 Overburdened resources

4 Late assignment of tasks to resources

8 Outdated project management method (SW)

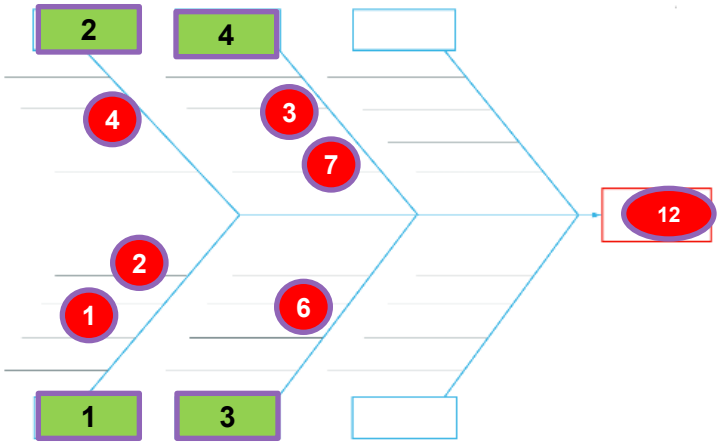
3 Inefficient communication tool (SW)

2 No investment in software

7 No workflow software (method and tool)

1 Cost Worlds Tendency

Root problem



1 = Management

2 = Methodology

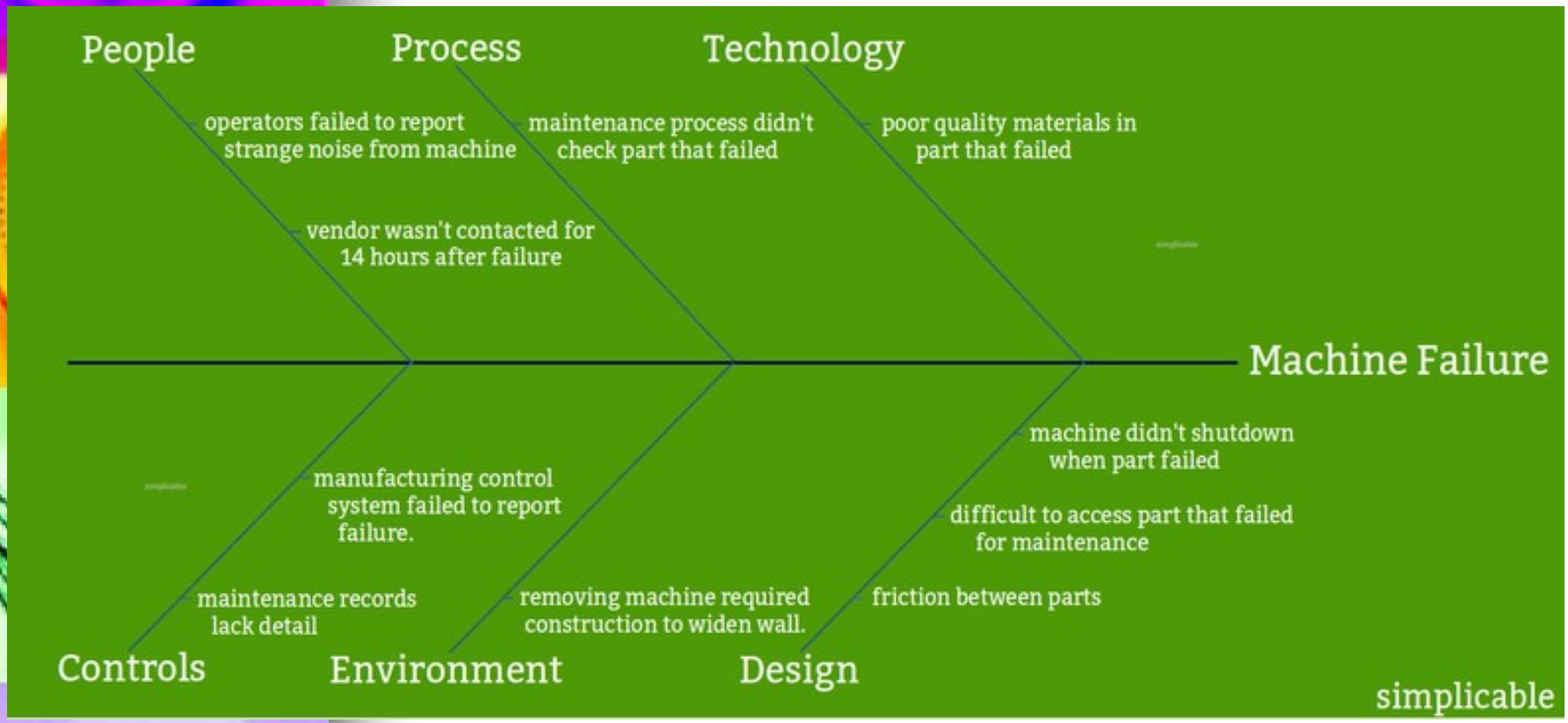
3 = Men

4 = Machine (SW)

	1	2	3	4	6	7
John	8	7	4	3	5	6
Caroline	9	5	7	8	5	6
Mean	8,5	6	5,5	5,5	5	6

SW=software

Example 1


People
Process
Technology
operators failed to report strange noise from machine
maintenance process didn't check part that failed
poor quality materials in part that failed
vendor wasn't contacted for 14 hours after failure
Machine Failure
machine didn't shutdown when part failed
manufacturing control system failed to report failure.
difficult to access part that failed for maintenance
maintenance records lack detail
removing machine required construction to widen wall.
friction between parts
Controls
Environment
Design
simplicable

Conclusion

Type	Problem Analysis
Definition	A visualization of the causes of a problem.
Also Known As	Ishikawa Diagram
Invented By	Kaoru Ishikawa
Related Concepts	Problem Analysis » Root Cause » Human Error » Internal Controls » Production Line » Root Cause Analysis »

Vilfredo Pareto in person…

Akira Ishikawa in person…