Means and Methods of Quality Management

Lecture

Quality Management Tools

Advanced Tools

TPM

5 S

LP

TQM

ISO 14000

ISO 9000

GMP

Just-In-Time

5W

QFD

7 QC+ 7QM

MSA

SPC

FiFo

Poka-Yoke

PPAP

FMEA

SWOT

MBO

LO

QL²

«5:0»

Standard ISO 9004-4-93

Introduction

……

Product quality and services is of great importance for the competitiveness.

Continuous quality improvement is necessary to ensure the competitiveness of the enterprise.

For this it is necessary to take into account all of the innovative strategy for the introduction of new products, services or processes, and continuous quality improvement.

Standard ISO9004-4-93

1. The scope of application

This standard provides guidelines for the implementation of continuous quality improvement at the company.

Methods for the adoption and implementation of these guidelines depend on factors such as the level of production standards, the size and nature of the enterprise, the types of products and services offered, as well as the requirements of the market and the consumer.

Therefore, the enterprise should develop a quality improvement process in accordance with their own needs and capabilities. .....

Standard ISO9004-4-93

4 Fundamental concepts

4.1 The principles of quality improvement……

Improving quality is a continuous activity aimed at regular increase the efficiency and effectiveness of the process.

Efforts to improve the quality in the first place should be directed to the constant search for improvement, rather than on identifying such opportunities have arisen as a result of the problem.

……

Standard ISO9004-4-93

4.2.3 Goals for improving the quality

Goal of improving the quality of should be set for all departments. They need to be closely linked to overall business objectives and provide direction to the fullest customer satisfaction, as well as to improve the efficiency and effectiveness of the process.

Goal of improving the quality of must be defined so that the process be measurable. They should be easy to understand, promising and significant to the case. ……

Standard ISO 9004-4-93

7. Auxiliary means and methods

Decisions based on an analysis of situations and information, played a leading role in projects and activities to improve the quality. The success of these projects and activities depends on the proper use of tools and methods developed for the intended purposes.

7.1 Means used for numeric data

If possible solutions for improvement of the valleys be based on numeric data. Solutions that address the differences, trends and changes in the numerical data should be based on a correct statistical interpretation, statisticalo

7.2 Means used for non-numeric data

Some solutions related to quality improvement can be based on non-numerical data. Such data play an important role in marketing, research, and development and management decisions. The corresponding funds must be used for proper handling of such data when converting them into useful information for decision-making.

Standard ISO 9004-4-93

Means and methods for non-numeric data		
1	Affinity diagram	The grouping a large number of people, beliefs or interests in relation to a particular subject
2	Fixed points	Comparison of the process with those found leading to identify opportunities to improve the quality management.
3	Brain storming	Identification of possible solutions to the problems and possibilities of improving quality
4	Cause-effect diagram	Analysis and report of cause –effect connections
5	Technological process map	The description of the existing process. The description of anew process.
6	Tree diagram	Identification of the relationship between the

Standard ISO 9004-4-93

Means and way for numeric data		
1	Test map	Stability assessment process Determining the need to adjust the process or the absence of such a need (for control).
2	Histogram	Show the nature of the variability of the data. Message of a visual depiction of the process. Making decisions about the point of focus of efforts to improve.
3	Paratoo diagram	Show (in order of importance) the contribution of each component in the overall result. Classification of the importance of opportunities for improvement.
4	Dispersion diagram	The detection and confirmation of dependencies between two related sets of data. Confirmation of the expected relationships between two related sets of data.

Tools KAIZEN for testing process quality (7QC)

- Checklist
- Histogram
- Paratoo diagram
- Stratification method (data striping)
- Dispersion diagram(dispersion)
- Isikava diagram (cause-effect diagram)
- Test map

Seven major tools of quality control

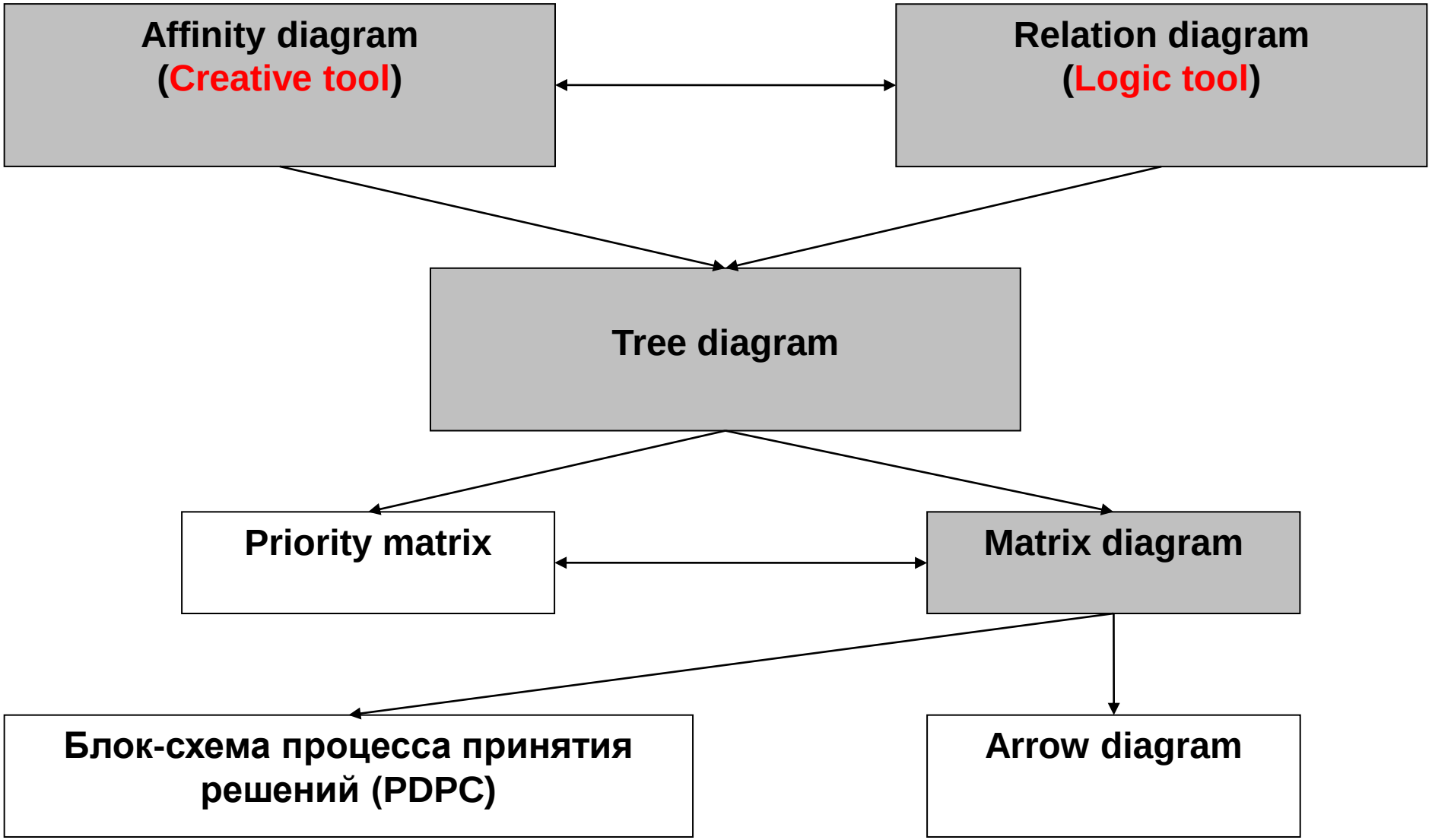
A set of tools to ease the task of monitoring of the processes and to provide various kinds of facts to analyze, adjust and improve processes;

Seven simple statistical methods - a tool of knowledge, and not management.

Seven new methods KAIZEN of quality

- Affinity diagram
- Relations diagram
- Tree diagram
- Matrix diagram
- Matrix data-analysis diagram
- Process Decision Program Chart
- Arrow diagram

Relationship and sequence of the development 7 new tools of quality management



Affinity diagram

Affinity diagram – creative tool, that helps to clarify unsolved problems, discovering nonvisible relations between separate parts of information or ideas, by means of collecting from different sources unsystematically produced *oral data* and their *analysis* according to the principle of interrelated affinity. (associative nearness).

Structuring detailed data to more general conclusions, using for providing the initial *structure* in researching problem.

Affinity diagram

Affinity diagram is regarded as the tool for making up more numbers of ideas, opinions and information, related to the problem or subject domain, when it is necessary to compile them for determining interrelations between them.

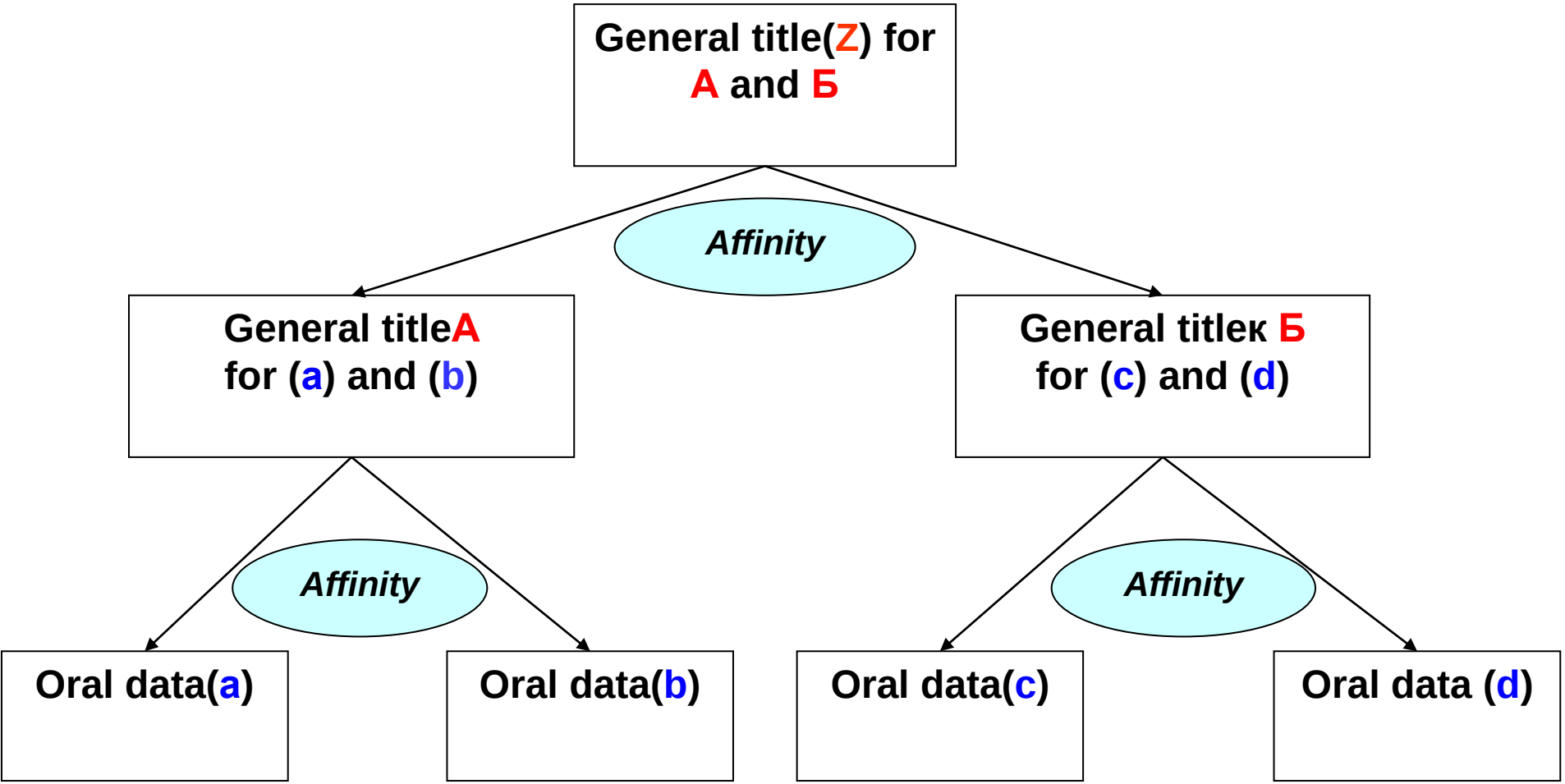
Affinity diagram is creature of big structuring volume of *verbal information* and illustrated rather *associations*, then logical connections.

Affinity diagram

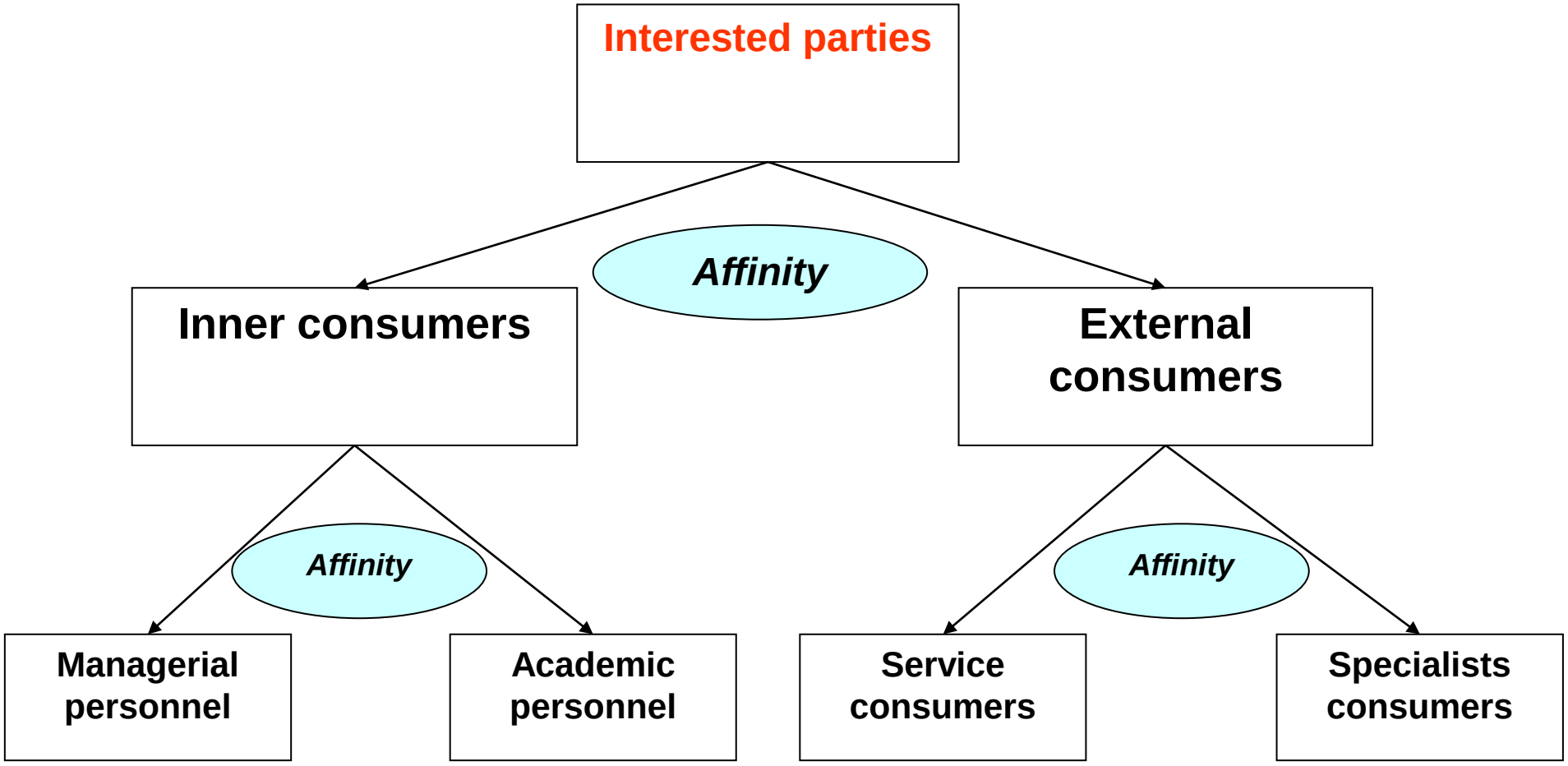
Affinity diagram is a tool to identify the major violations of the process (or the possibility of improving it) by combining related interpretations of the data collected as a result of "brainstorming" ("storm", "Siege").

Affinity diagram can distribute on several groups(А, Б) the big quantity(a,b,c,d) of ideas, opinions and interests collected by specialists on the concrete theme (Z).

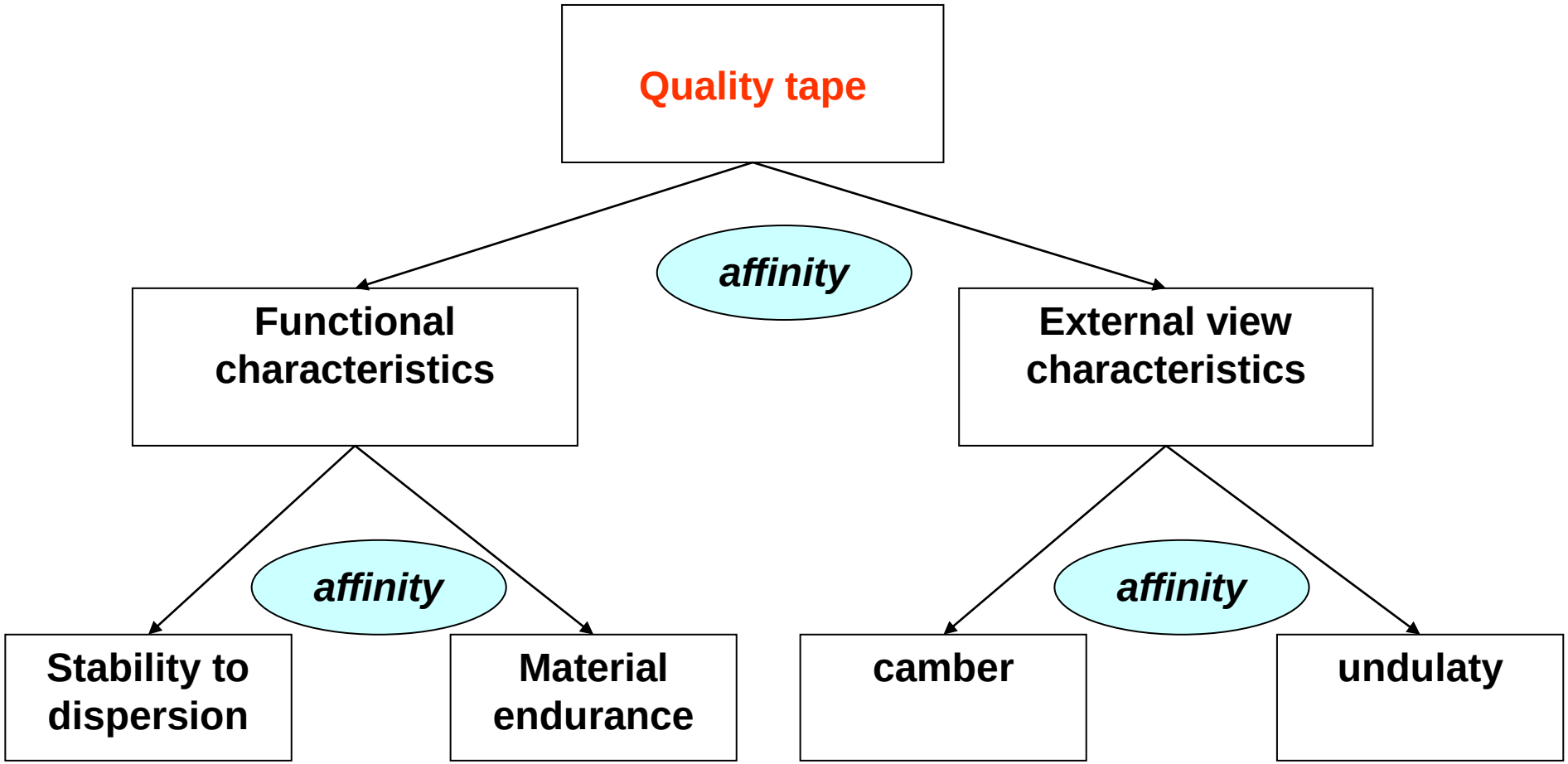
Affinity diagram



Sample diagram affinity interested parties of the university



Affinity diagram example of consumer



Creating way of affinity diagram

- To organize *team* of specialist possessed by questions on being discussed topic;
- To define *subject* or *topic*, which is the milestone of collecting data;
- To collect data, which should be produced within the «brainstorming» near the topic;
- To group related data together according to the *goal and principles problem* to be solved.

Recommendations in creating affinity diagram

- In formulating topic for discussion use the rule «*7 plus or minus 2*». The sentence should have not more then 5 and not more 9 words, include a verb and a noun
- In conducting “brain storming” use standard methodology
- Every formulation written on a special separate *card*
- If the card may be assigned to more than one group one should make copies

Relations diagram

Relations diagram (relations) – tool, allow to clear *logical connections* between core idea, problem and different data

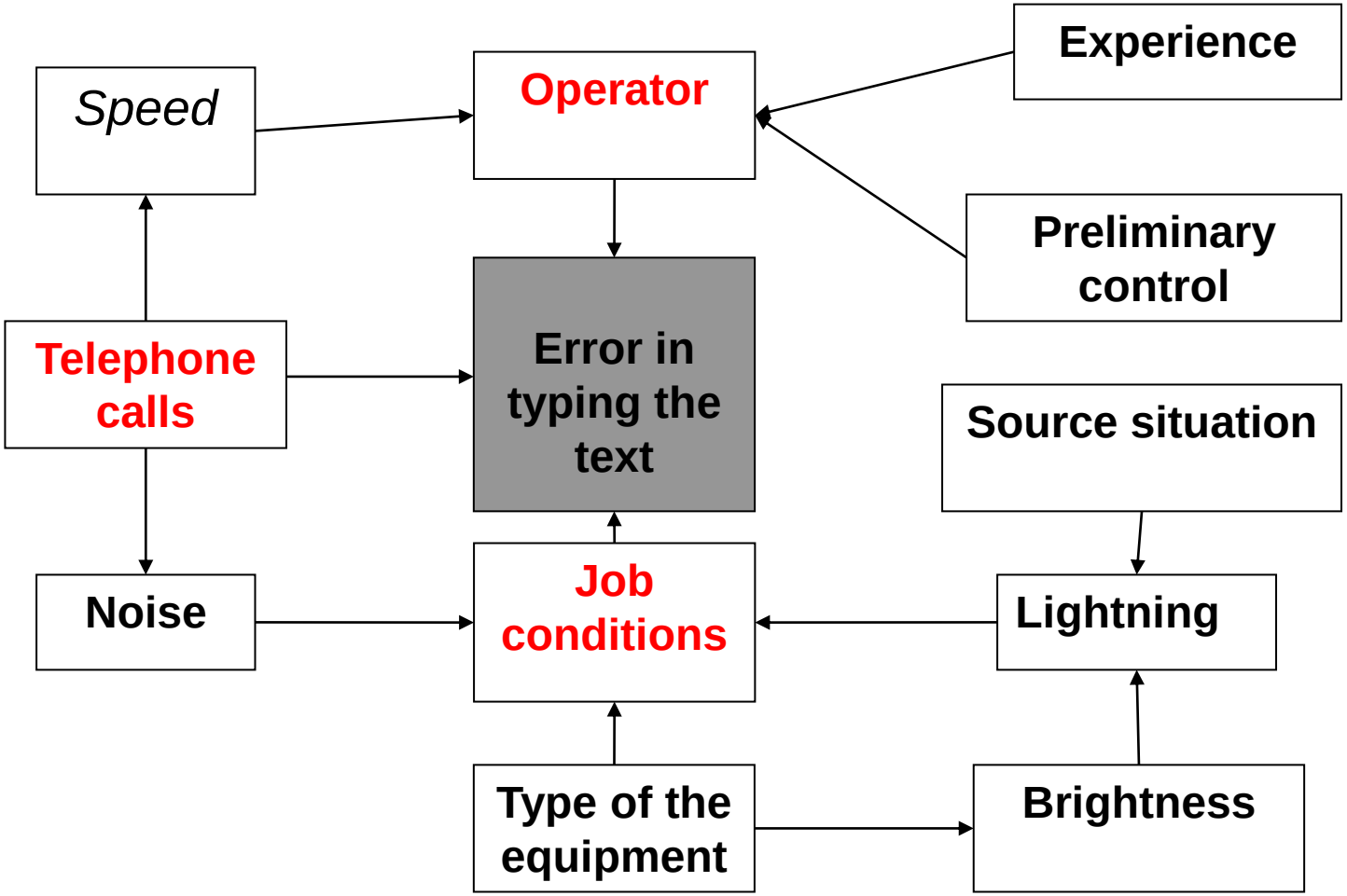
Relations net «cause-effect» is used for finding causes and consequences for conducting business.

Relations diagram

The goal of the tool is *balance* establishment of main causes of process abnormality detected by means of relations diagram to those problems which acquire solutions.

So, there are some similarities between relations diagram and Isikava diagram.

Example of relations diagram



Creation way relations diagram

- To form *groups* for work over relations diagram
- To define *researched object*(result)
- Generate core *causes*, required for work (it might be affinity diagram)
- To regard (consequently) *interrelations* between two groups

Tree diagram

Tree diagram (systematic diagram) – tool provided *systematic way of permission* of essential problem, central idea or need's satisfaction of consumers presented at different levels.

Tree diagram

Tree diagram provides intermediate planning and allow to discover in certain logical hierarchical sequence the *system of strategic decisions of problem* or *means achieving the goal* eliminated probability that any significant items will be missed.

Tree diagram

Cause ▶	Cause1 ▶	Cause 1.1 ▶
		Cause 1.2 ▶
	Cause 2 ▶	Cause 2.1 ▶
		Cause 2.2 ▶
	Cause 3 ▶	Cause 3.1 ▶
		Cause 3.2 ▶
	Cause 4 ▶	Cause4.1 ▶
		Cause4.2 ▶

Tree diagram concept

Every object(issue) is *research goal .*

It has many attracting sides for consumer.

Some of these sides (elements of the first level) directly connected with the object's construction. Another have relations to consumer's taste.

All *elements of the second level* are situated on the branches come from rectangular with the formulation of basic tasks which should be satisfied as they supply *core (basic) quality*.

Sample of tree diagram

Quality tapes	**Functional characteristics**	Resistance stratification	Tough connections between frame and coat
			……
		Wear resistance coats	Volume losses in scuffing
			……
	External view characteristics	camber	……
		waviness	……
		Surface quality	……
		……	
	Delivery set	Attached documents	……
		……	
		……	

Construction Rule of tree diagram

Diagram is constructed in the form of *horizontal chain*(from left to right) structuring answers for questions «how?» («what way?») and foreseeing logical checkup (in reverse direction) by means of the question«why?»

Tree diagram

Issue	Cause Elements of the first level	Cause Elements of the second level
Good functioning and use of the door	Easy to open and shut	Easy to shut the door
		Easy to open the door
		Easy to open inside
		Easy to shut inside
		The lack of feed back
		Stay opened at the definite position
	The window operates easily	Easy to reach handle
		Easy to grasp the handle
		Convenient manual operation
		Dried
		Acts quickly
	It is convenient to open the door	Flywheelx of the inner lock operates easy
		Key operates easy
		Doesn’t freeze
	Doesn’t let through water	Doesn’t let through water
		Doesn’t drop from the opened door

Matrix diagram

Matrix diagram is a tool allows to figure out the importance of different hidden connections, i.e. *to research the problem structure*.

Matrix diagram due to *multidimensional presentation* depicts elements, connected with the problem situation or events and allows to understand the problem essence.

Types of matrix diagram

- Matrix - *triangular* (roof size);
  - Matrix *L – size*;
  - Matrix *T –size*;
  - Matrix *Y– size*;
  - Matrix *X – size*;
  - Matrix *C – size*.

Matrix L-size diagram

L-diagram	**Interchangeable 2** (for example, processes)				
Interchangeable 1 (for example, expect consumers)					

Symbols for L-size matrix diagram (matrix of correspondence)

Dependence	Symbol	Weight
Weak	Δ	1
Average	O	3
Strong	Θ	9

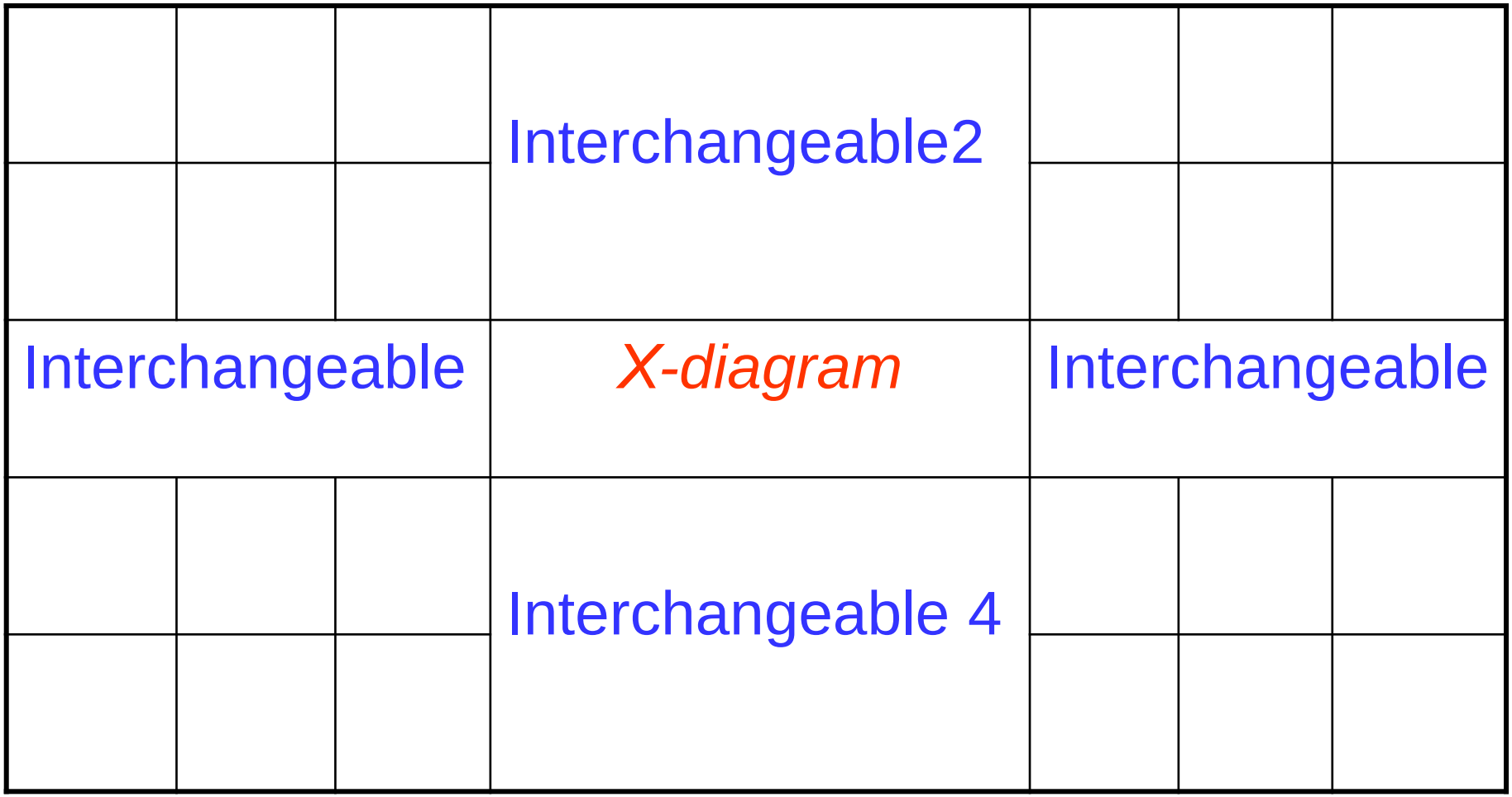
Matrix diagram of supplying process (example L-size diagram)

Name of the supplying process	What document described	Process maternity	Practical use of process	Total evaluation of the process, points
1. Management process of personnel	DP	▲	Θ	10
2. Process of preparation and professional development of science and pedagogical staff	DP	Θ	Θ	18
3. Management process of audit fund	DP	O	Θ	12
4. Process of supplying safety	DP	O	Θ	12
5. Management process of logistic supply	DP	▲	O	4

Matrix T-size diagram

Interchangeable1				
T-diagram	Interchangeable 2			
Interchangeable 3				

Matrix X-size diagram



Matrix diagram

Type of matrix diagram	Variables number	Direct connections	Indirect connections
L	2	1	0
T	3	2	1
Y	3	3	0
X	4	4	2
C	3	3 simultaneously	0
«Roof»	1	-	-

Symbols for triangle matrix diagram («roof»)

Dependence	Symbol
Strong positive	Θ
Weak positive	O
Weak negative	×
Strong negative	◊

Thank you
for your attention