

- 1. The problem as a Contradiction**
- 2. Contradiction Overcoming  
(Su-Field Analysis)**

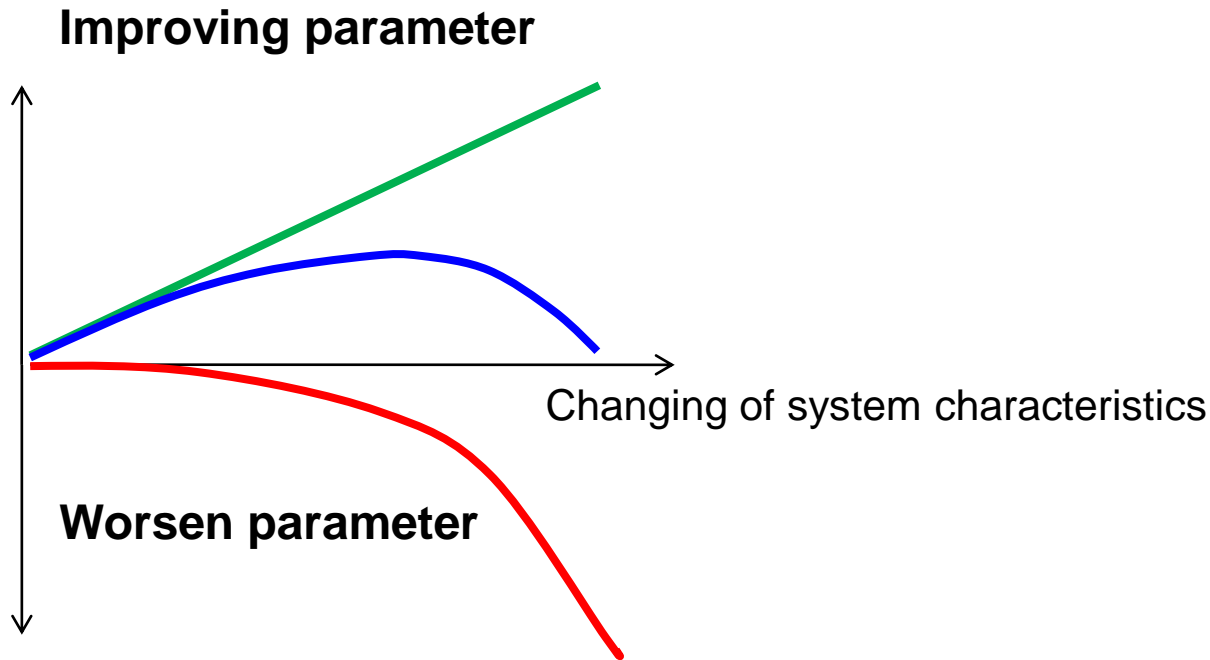
- The firm will fulfill job
  - quickly
  - well
  - cheaply
- You can choose TWO properties

In TRIZ the problem is obvious or not obvious contradiction

To solve the task means to find and to eliminate this contradiction

**TECHNICAL CONTRADICTION (TC)** - when you want to improve one description of system, but another may become worse

**PHYSICAL CONTRADICTION (PC)** – when your demands to physical condition of one system element are contrary

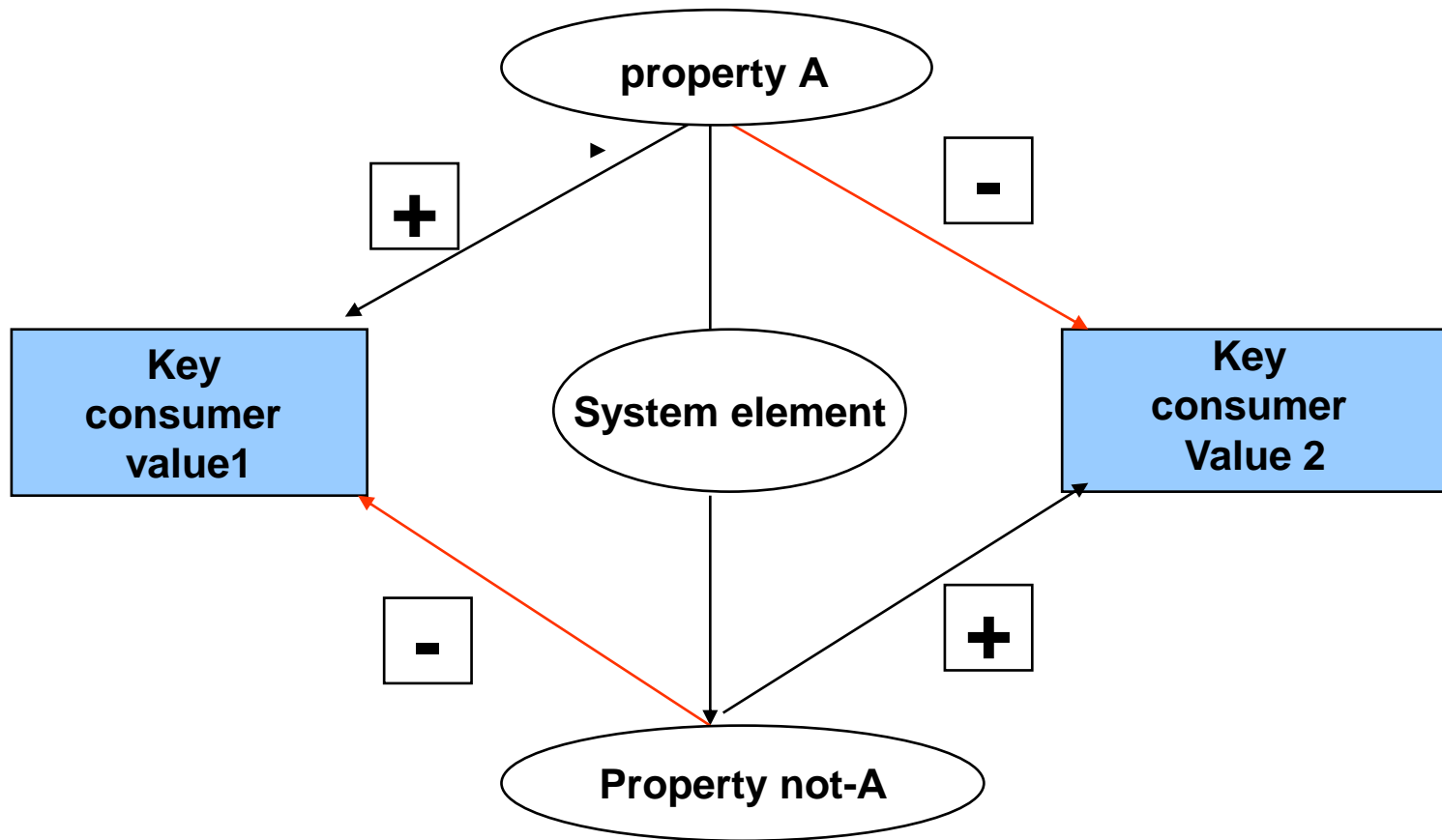


**Technical contradiction (TC):** improving and contamination of system qualities under system element changing

- **TC1**: if system has condition **A** (*to point out*), system consumer's quality 1 will be better (*to point out*), but consumer's quality 2 will be worsen (*to point out*)
  
- **TC2**: if system has condition **NOT A** (*to point out*), system consumer's **quality 2** will be better (*to point out*), but consumer's **quality 1** will be worsen (*to point out*)



TC:



Consumer values – consumer pays for its  
**A** and **not-A** – designer changes its (elements parameters)

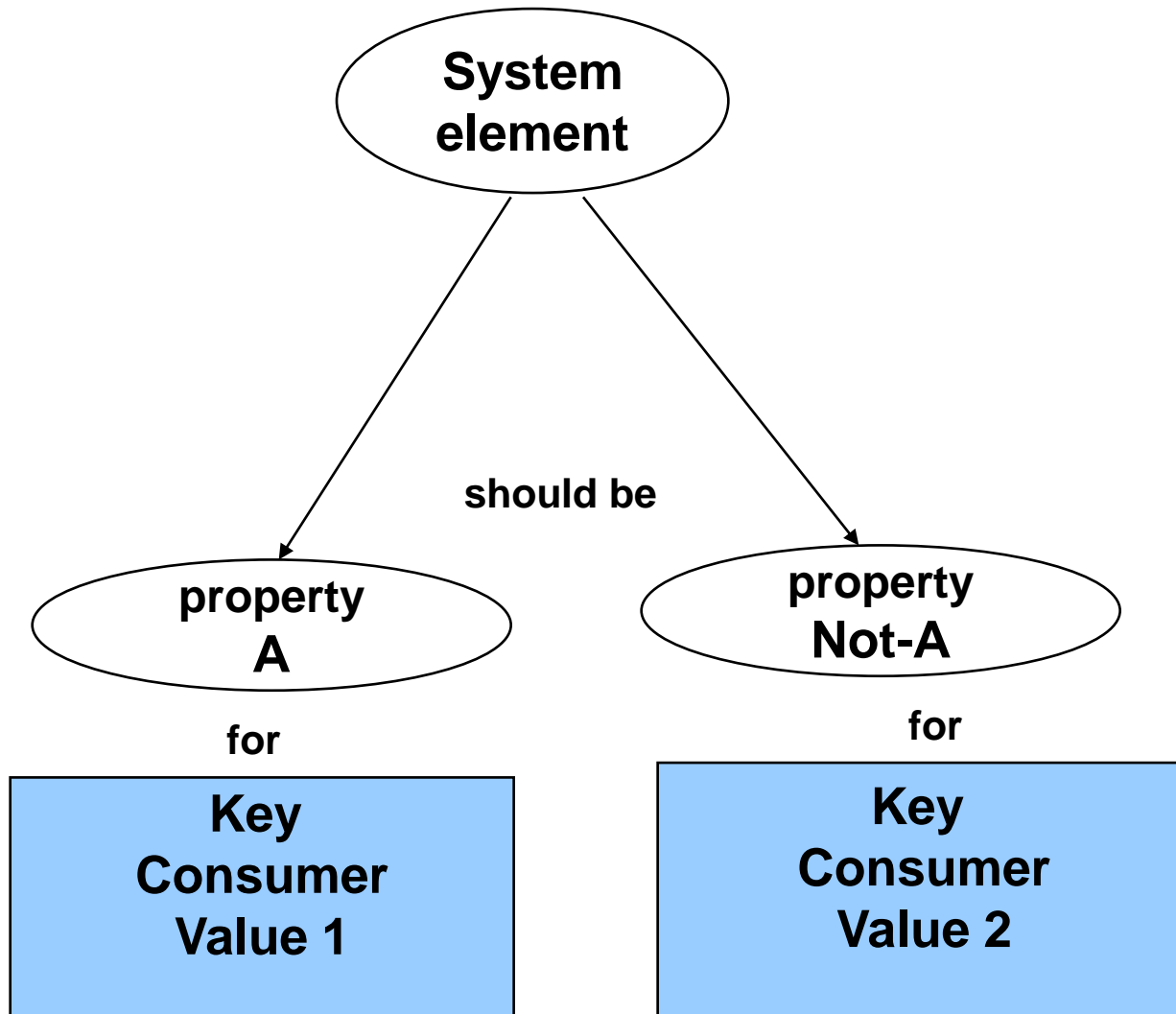
**Technical Contradiction** – description of problem situation when impossible to obtain all the targets

You have problem situation – it is necessary to formulate

**inventive task – physical contradiction**

- ▶ **Physical Contradiction** – contrary demands for main element parameter
- ▶ **The Goal is** - to improve system quality and consumer value

## PHYSICAL CONTRADICTION:





If to increase the dimension of automobile rear-vision mirror it will be improvement of round up, but it will be worsen the possibility to move in transport stream

Automakers have to use compromise - to use mirrors when the round up is not the best

**HOW TO BE?**

Stowed (flexible) mirror (settlement in time)

or

Possible to pose the mirror on roof wide without increasing of auto dimensions (settlement in space)

or

Convex mirror where compactness is combined with round wide (settlement in relations)

or

To change mirror to video with information on the monitor of driver (settlement in system)

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But in winter IR can not to get into house and consumer value of the window is to worsen

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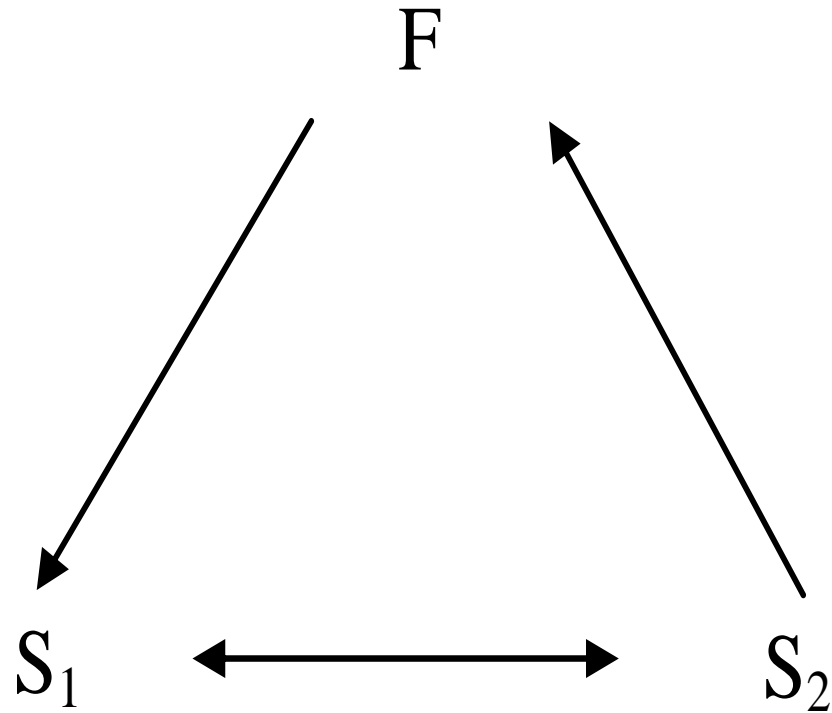
It has been suggested **thermo chrome glass**

Inner cover of the glass by oxide vanadium under temperature can switch.

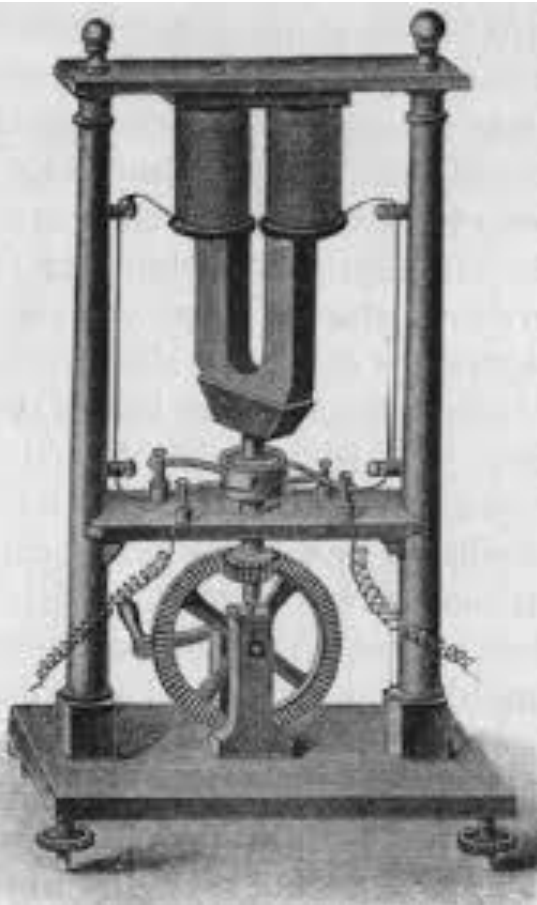
**Only IR getting is changed**

**the result: the glass passes sun warm under low temperature and reflects under high temperature**

# Substance-Field Analysis



# $M$ – mechanical field (interaction):



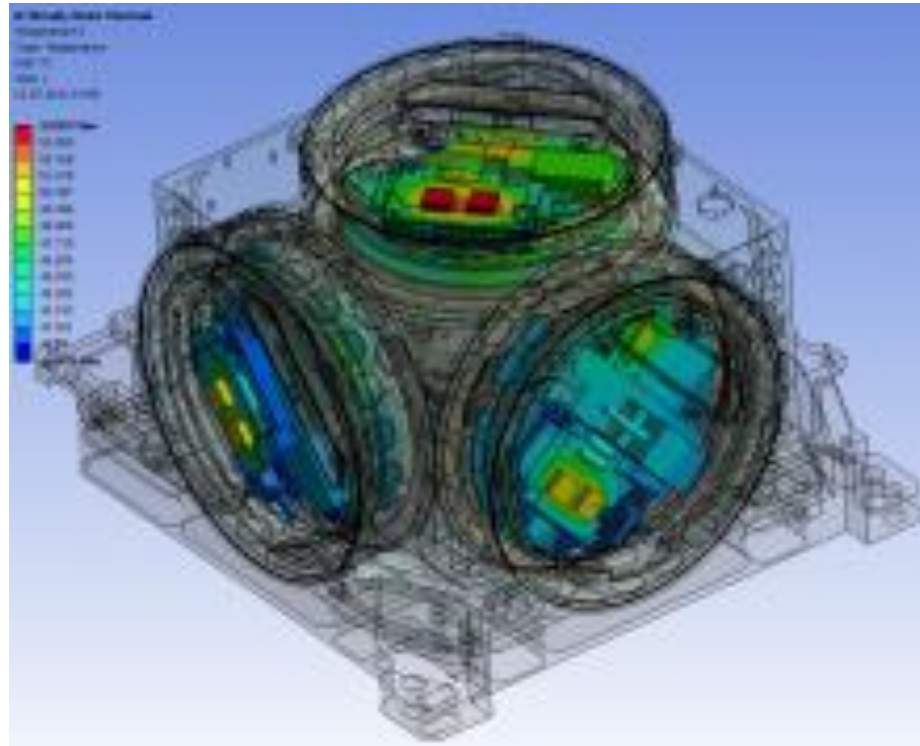
simple mechanical force and deformation in different directions  
pressure (increasing and reducing)  
inertial, gravity and centrifugal forces  
vibration, blow, air and hydro dynamical effects

# A – acoustic field

continues mechanical field action:  
acoustic vibrations,  
infra and ultrasound,  
stationary waves,  
resonance oscillations

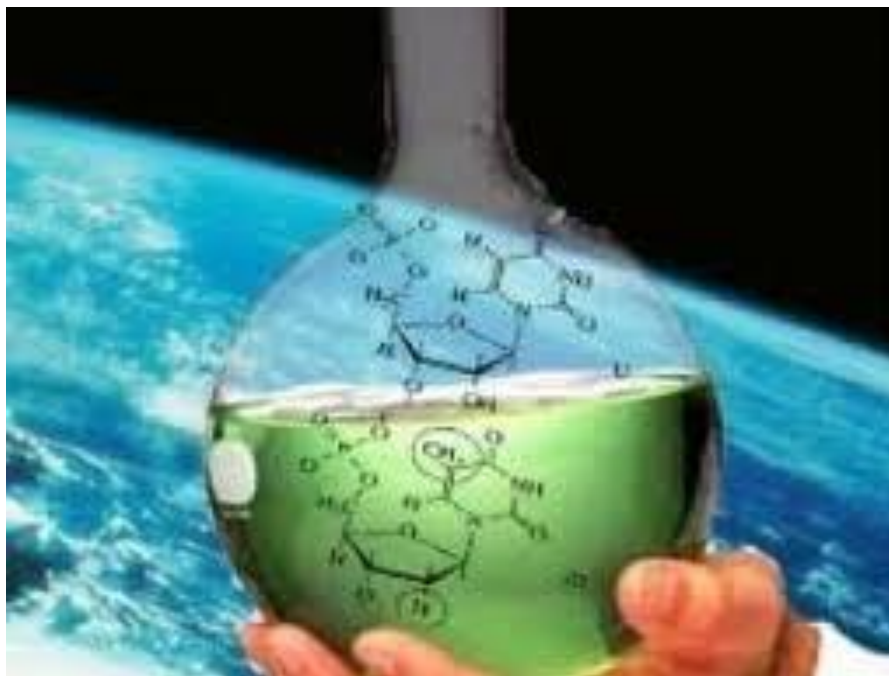


***H*** – heat field (heating and cooling)





**C** – chemical field (interaction), using different chemical reactions



***E*** – electrical field including electrostatic and constant/alternating current field



***M*** – magnetic field, generated by permanent magnet or constant/alternating current

