



# Application of TRIZ for increase in competitiveness in economy and education

Anatoly Guin, TRIZ Master

10<sup>th</sup> TRIZ Symposium

Tokyo, Japan

September 12<sup>th</sup>, 2014



Globalization –  
regardless of  
how we  
perceive it is  
inevitable!

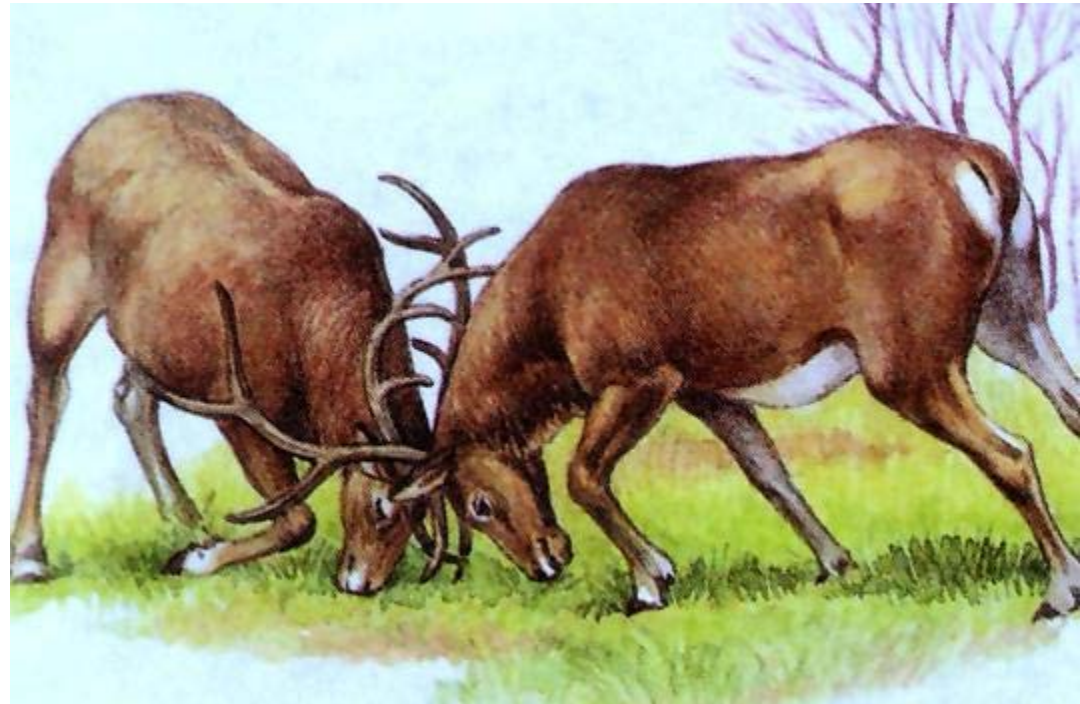


глобализации

EDUCATION FOR A NEW ERA



The World became "small"



Global competition between people and communities



## A tool and its effectiveness





## A tool and its effectiveness



Effectiveness  
grew by the  
factor of  
40 000!



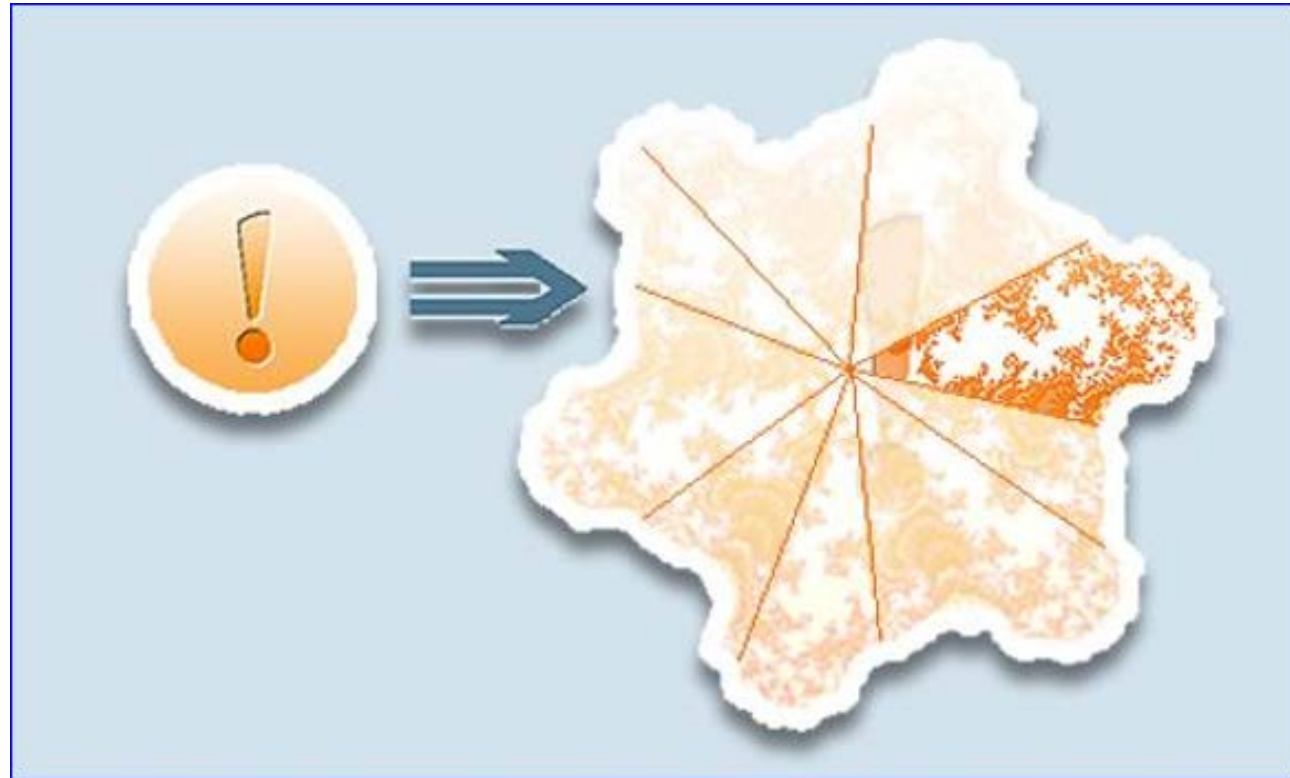


# TRIZ: the trend of human displacement from technical system





+ a number and complexity of creative problems is always increasing



That's how great Archimedes saw this tendency...



What's left for a human is intellectual/creative activities.  
Is it possible to increase efficiency of these activities?  
And if so, how?





## An example of an intellectual tool



Math in 14<sup>th</sup> century Europe:

$$x^2 - 12x - 28 = 0$$





# FORMULA FOR INTELLECTUAL PRODUCTIVITY

$$\text{Results} = P_c \times P_{kn} \times Mo (1 + T) \times (1 + Met)$$

Where:

$P_c$  = Personal Capability

$P_{kn}$  = Personal Knowledge

$Mo$  = Motivation

$T$  = Tools

$Met$  = Methodology



MARK BARKAN, USA



# Fortune 500 and TRIZ

Many of Fortune 500 companies use TRIZ

Table 1

**Fortune 500 Companies Have Been Granted over \$700 Million in ATP Dollars**

Fortune 500 Corporation	F-500 Rank	2002 Revenue	2002 Profits	ATP Grants 1990-2002
IBM	8	\$83,132,000,000	\$5,334,000,000	\$126,583,013
General Electric	5	\$131,698,000,000	\$15,133,000,000	\$84,605,816
General Motors	2	\$186,763,000,000	\$1,736,000,000	\$78,554,789
3M	110	\$16,332,000,000	\$1,974,000,000	\$44,200,860
Motorola	59	\$26,679,000,000	\$2,485,000,000	\$11,951,464
Honeywell International	78	\$22,740,000,000	\$220,000,000	\$31,573,685
Ford	4	\$163,630,000,000	\$284,000,000	\$25,944,175
Oracle	190	\$9,673,000,000	\$2,224,000,000	\$24,623,388
Caterpillar	85	\$20,152,000,000	\$798,000,000	\$4,550,768
Xerox Corp.	116	\$15,849,000,000	\$154,000,000	\$23,582,852
NCR	304	\$5,585,000,000	\$128,000,000	\$21,382,938
Dow Chemical Co.	51	\$7,609,000,000	\$465,000,000	\$16,860,992
United Technologies	49	\$28,212,000,000	\$2,236,000,000	\$16,372,854
Eastman Chemical Co.	315	\$5,320,000,000	\$79,000,000	\$15,623,233
Sun Microsystems	155	\$12,496,000,000	\$587,000,000	\$13,841,000
DuPont	67	\$24,523,000,000	\$1,841,000,000	\$12,175,975
Praxair	324	\$5,128,000,000	\$548,000,000	\$11,916,803
Science Applications Intl.	288	\$6,104,000,000	*	\$11,463,060
Boeing	15	\$54,690,000,000	\$902,000,000	\$10,102,331
Lucent	141	\$15,548,000,000	-\$11,826,000,000	\$9,400,000
Hewlett-Packard	14	\$56,588,000,000	\$923,000,000	\$7,804,654
ConocoPhillips	12	\$58,247,000,000	\$714,000,000	\$7,769,860
Lockheed Martin	56	\$38,060,000,000	\$531,000,000	\$7,262,232
Edison	163	\$11,838,000,000	\$1,135,000,000	\$5,871,000
Air Products & Chemicals	311	\$5,401,000,000	\$525,000,000	\$4,104,914
PPL	309	\$5,429,000,000	\$425,000,000	\$3,840,023
Cummins	296	\$5,833,000,000	\$162,000,000	\$2,746,480
ChevronTexaco	7	\$92,430,000,000	\$1,132,000,000	\$2,695,200
Northrop Grumman	99	\$17,837,000,000	\$697,000,000	\$2,382,000
Wyeth	128	\$14,584,000,000	\$447,000,000	\$2,379,000
Johnson & Johnson	34	\$56,298,000,000	\$5,597,000,000	\$2,000,000
Dana Corporation	182	\$10,283,000,000	\$58,000,000	\$2,000,000
Corning	455	\$3,432,000,000	-\$1,780,000,000	\$1,999,705
Medtronic	276	\$6,411,000,000	\$98,000,000	\$1,980,000
Texas Instruments	223	\$8,383,000,000	\$344,000,000	\$1,971,000
Owens Corning	338	\$4,872,000,000	*	\$1,900,000
Armstrong Holdings	478	\$1,720,000,000	*	\$1,870,000
Medtronic	276	\$6,411,000,000	\$98,000,000	\$1,980,000
Applied Materials	327	\$5,620,000,000	\$81,200,000	\$1,488,812
Baxter International	222	\$8,384,000,000	\$1,033,000,000	\$975,000
<b>TOTAL</b>		<b>\$1,030,297,000,000</b>	<b>\$11,419,200,000</b>	<b>\$709,118,260</b>

\*Not available.  
Sources: ATP grant data through September 2002 from Advanced Technology Program, National Institute of Standards and Technology; ATP Active and Completed Projects by State; updated June 16, 2003, at [www.nist.gov/atl/atlreport/atlreport.htm](http://www.nist.gov/atl/atlreport/atlreport.htm); profile and revenue data from Standard & Poor's Stock Reports, at [www.schwb.com](http://www.schwb.com) (subscription required).

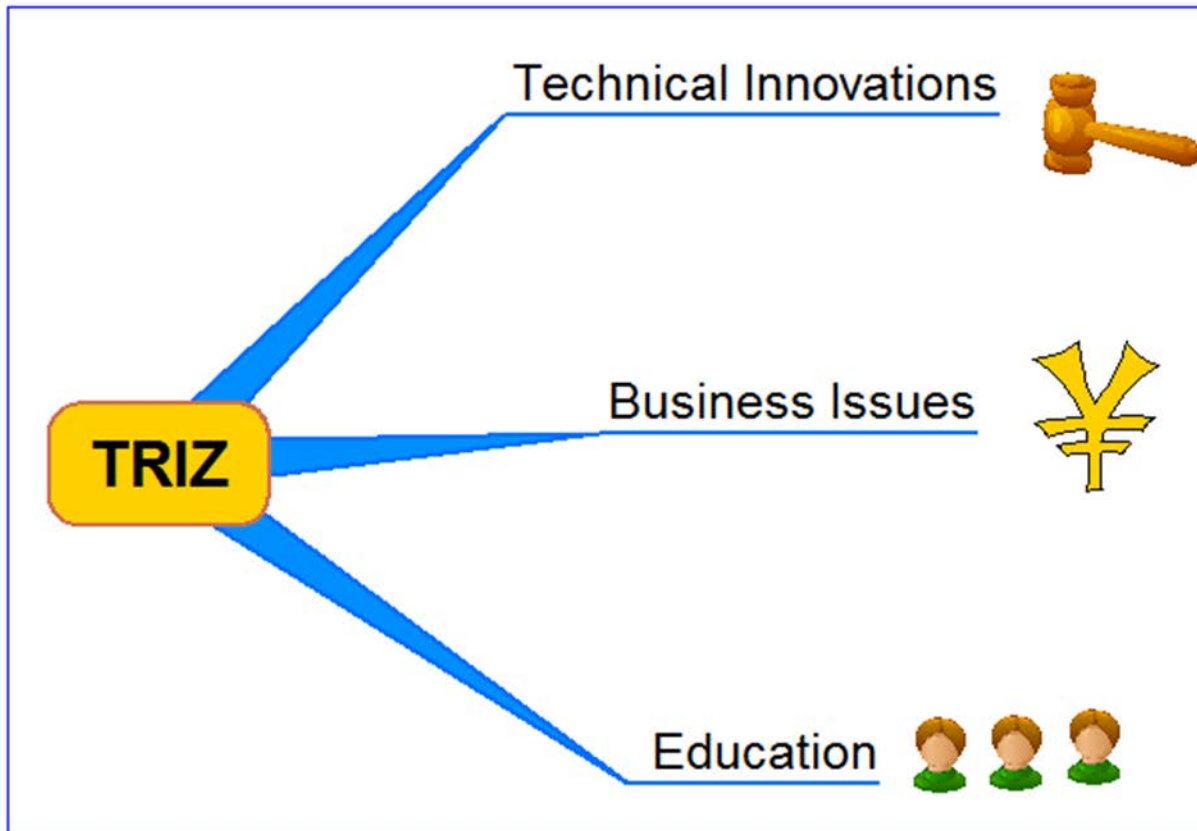


Ray Ogle, Vice president of Johnson & Johnson, “This new problem solving methodology may become an important innovation for research and development – our main weapon against the competition”.

Dr. Douglas Partridge, Rockwell International, “TRIZ methodology quickly leads us to promising solutions. It is much more systemic and scientific than traditional brainstorming”.



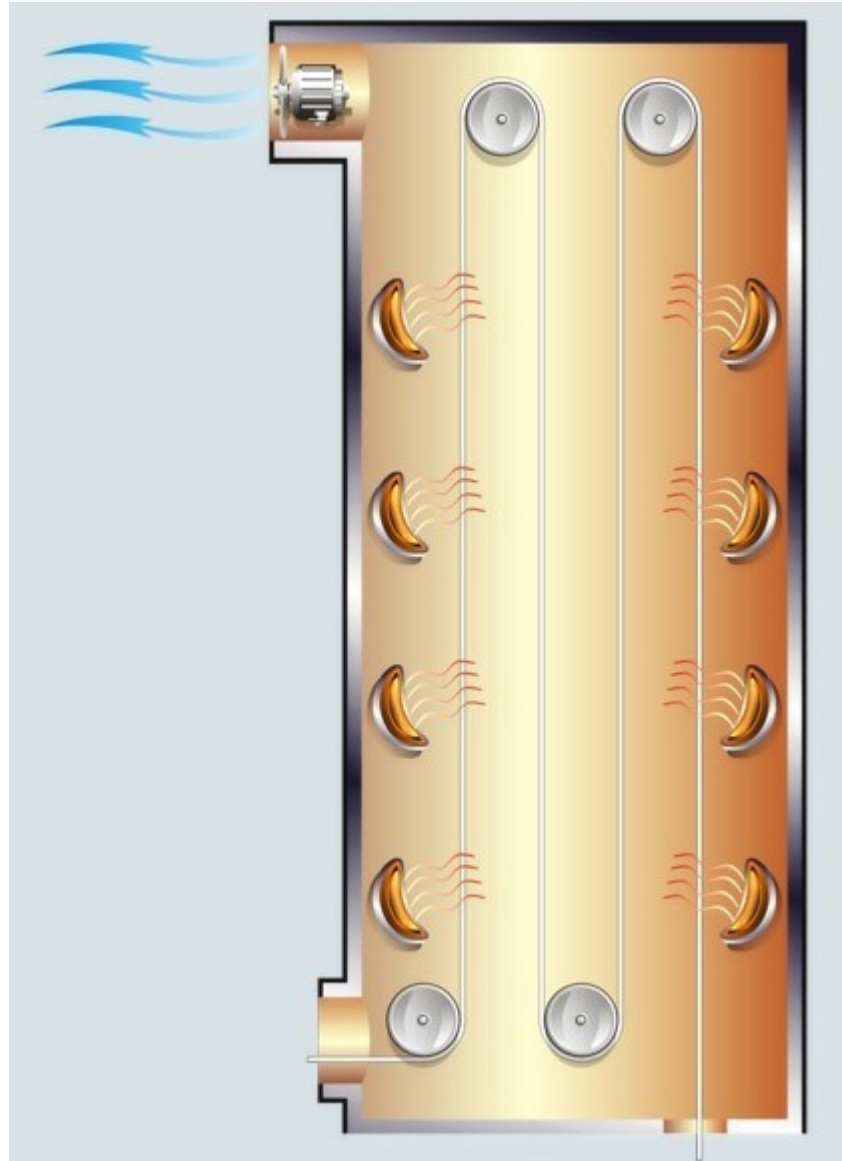
## Areas of TRIZ application



Examples



## Manufacturing of Roll Roofing

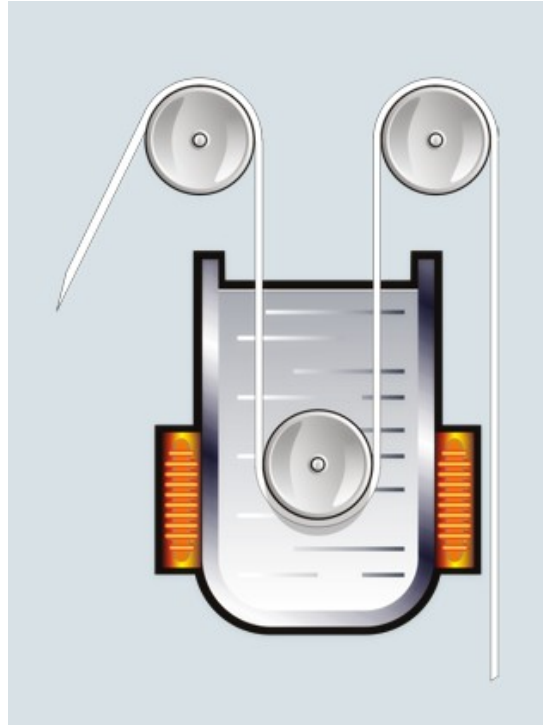


### Problems

- Energy intensive
- Large size
- Tape stays wet too often
- Requires more power



# TRIZ effectiveness: problem solving



## Solution

- Reduced energy consumption by a factor of 5
- Tape completely dries
- Size is significantly reduced
- No need for increase in power



A small office of a financial company.

They must issue various sums of money to several thousand people in 2-3 days

A crowd may form, containing a lot of elderly people, who will complain about having to stand in line without any comfort.

What to do?



Education is the only tool for direct management of the future!





– Why it is useless to make an attempt to convince a hog to study the astronomy?



– Because it never saw the sky!



## **In a dynamic informational world:**

- Knowledge is more important than natural resources
- Skills are more important than knowledge
- An ability to learn is more important than skills
- An ability to creatively process knowledge is more important than an ability to learn



# Innovation in education

Equipment

Structuring of educational process

Content of education

On a class level

On a school level...

On the level of a worldwide education system

On a level of single discipline

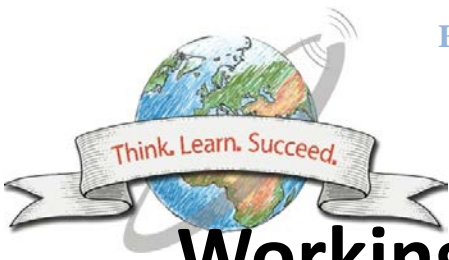
**For thinking methods**



# Working with contradictions

- clash of cultures = contradictions
- clash of the techno-sphere and the biosphere on the planet = contradictions

The traditional school **doesn't** teach how to solve contradictions



# Working with poorly organized information

## Necessitates:

- an ability to quickly identify useful data
- work under conditions of insufficient and excessive amounts of information
- recognize manipulative influence from the media and various groups of people
- An ability to recognize various types of knowledge: domestic, religious, scientific ... Understand how to construct different knowledge systems

The traditional school **doesn't** teach how to work with various types of information!



# TRIZ-pedagogy

Development of Creativity

Teaching how to solve various problems:

- open
- creative
- heuristic
- research
- inventive



# BIOLOGY: Whales in rivers

Whales are marine animals. But sometimes they come into the mouth of large rivers. Very often, for example, whales may be observed at the mouth of the Zaire River. How can this be explained?

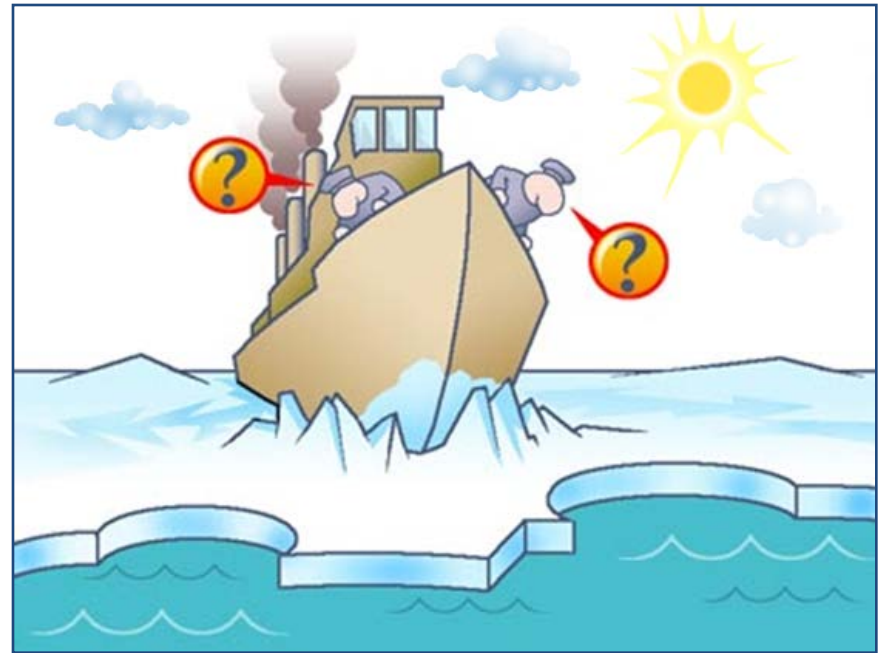






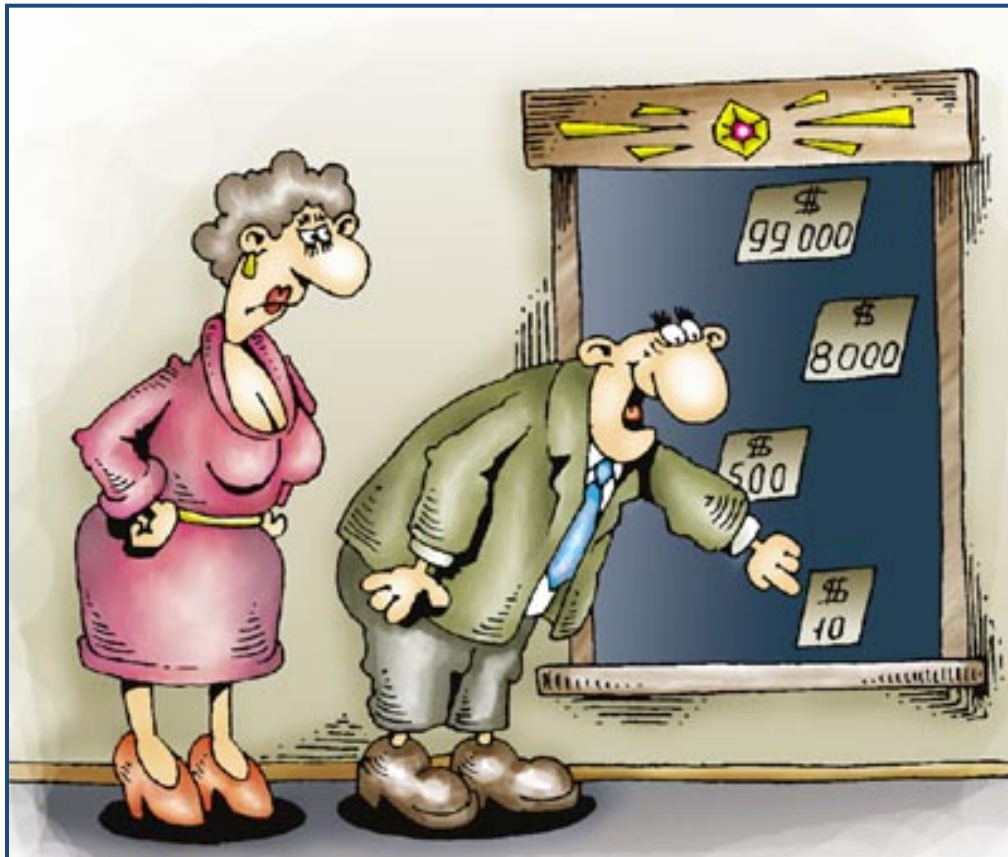
# PHYSICS AND TECHNOLOGY: Towards open water

Beginning of the 20th century. Laptev Sea. Navigation season is nearing the end. Ice forms around the steamer "Gauss" due to freezing temperature at night. There is just one kilometer to open water. During the day the sun is bright, but there is not enough time to melt the ice. What to do?

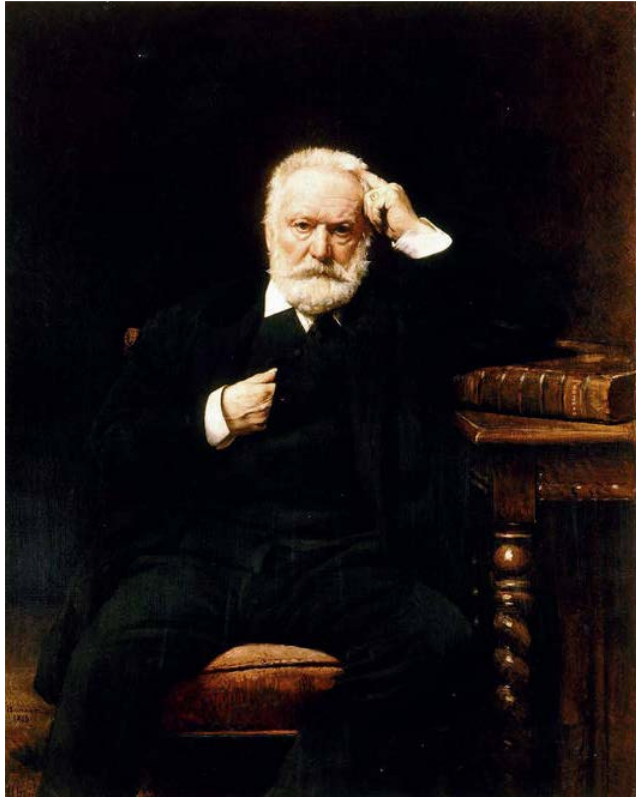




# BUSINESS: Shine always, shine everywhere...



During an energy crisis in Holland the government introduced austerity measures. Even store windows remained dark at night. This measure really affected jewelry store owners for jewelry look best when the light is shining. But the store windows are dark. What should jewelry store owners do?



**“There is something mightier than all the armies of the World: the idea whose time is now!”**

***Victor Hugo***



Countries, which support education with scraps, would have to be content with scraps in every other area of their lives.

Anatoly Guin

