



Centre for

**INDUSTRIAL APPLICATIONS OF MATHEMATICS
and SYSTEMS ENGINEERING**

"We solve problems"

Kraków, 27.11.2014

Industrial mathematics in Poland - the past, the present, the future

Marta Zagórska, dr Piotr Ziolo,

Industrial mathematics or applied mathematics?

And the difference is...

And the difference is...



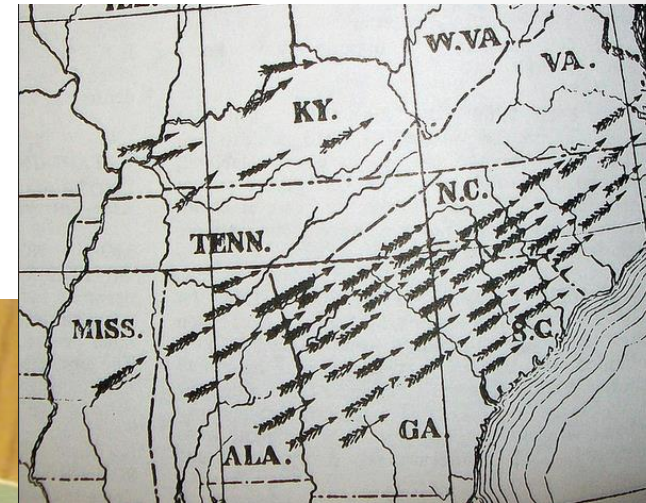
The past...

RAND Corporation

- Established in 1948
- American think-tank
- People: John von Neumann, John Nash, Harry Markowitz, Thomas Schelling, Donald Rumsfeld, Condoleezza Rice
- Examples:
 - MAD (Mutually Assured Destruction)
 - Space research, artificial intelligence, power engineering, national security, social sciences, law

Enigma

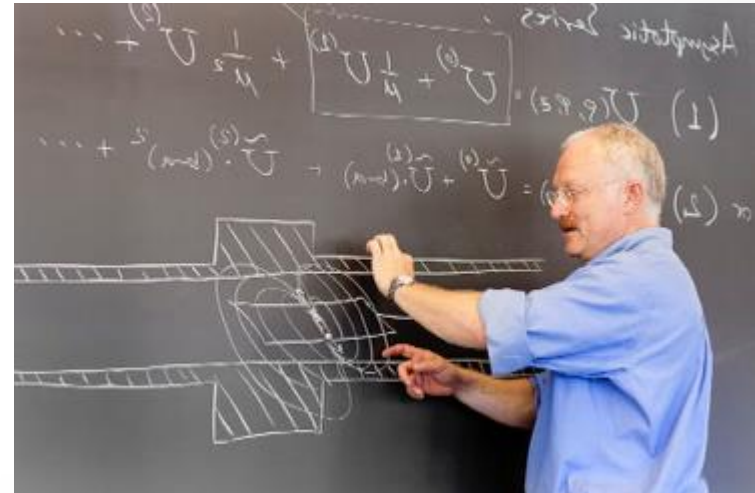
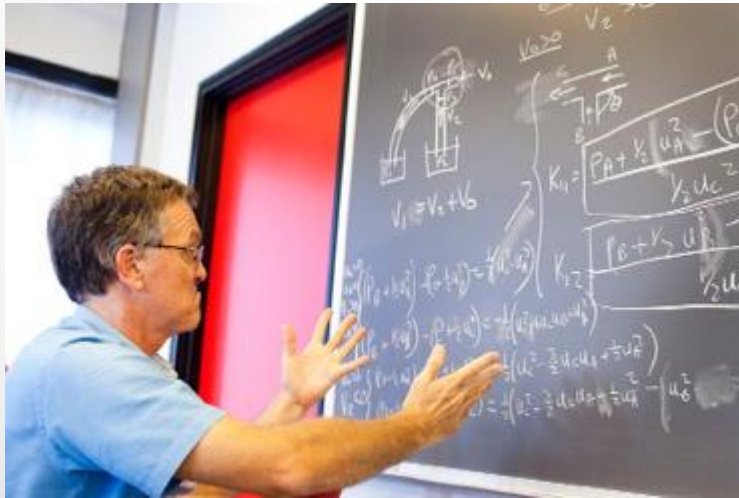
- Różycki, Rejewski, Zygałski
- Important during World War II



The present...

European Study Groups with Industry

- First Study Group with Industry – 1968 in Oxford
- 105 study groups
- A workshop for mathematicians, engineers, physicists, etc.
- Science and business



CIAMSE



- Following the best British practices
- Established in 2010 in Warsaw
- Founded by "Industrial Mathematics and System Engineering" research group
- Summer and winter internships for students
- More than 50 projects for various companies
- Participation in Study Groups – Great Britain, Denmark, Serbia, South Africa...

(Some of) our projects



Letnie Praktyki Badawcze



LETNIE PRAKTYKI BADAWCZE

- Summer internship for students and Ph.D. candidates in mathematics, economy, engineering, chemistry, computer science...
- Every year since 2005
- Various projects – scientific and industrial

The future...

The beginning of a new era?

Crowdfunding

KICKSTARTER

MARS  NE

The beginning of a new era?

Crowdfunding

KICKSTARTER

MARS  NE

Crowdsourcing



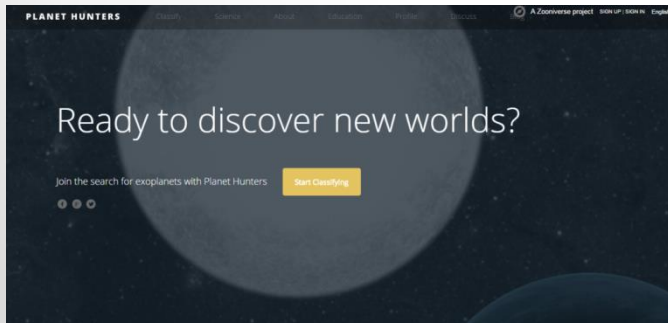
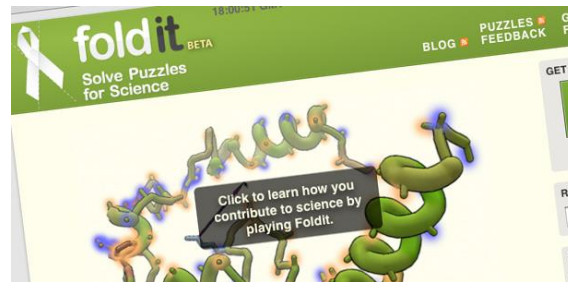
WORDPRESS



WIKIPEDIA
The Free Encyclopedia

Crowdsourcing

- Francis Galton's experiment on cattle market – first prediction
- Now – everyone can contribute



Prediction markets

- Speculative markets created for the purpose of making predictions
- Current market prices can then be interpreted as predictions of the probability of the event – the decision is binary YES/NO

Prediction markets

- Speculative markets created for the purpose of making predictions
- Current market prices can then be interpreted as predictions of the probability of the event – the decision is binary YES/NO
- Example – will Bronisław Komorowski win the presidential election in Poland in 2015?

L.E.M. nano

L . E . M .
nano

- First polish prediction market
- Industrial Development Agency & CIAMSE
- Problems – nanotechnology, graphene, disruptive technologies

www.lem-nano.pl

L.E.M. nano - mechanism

- Users predict if the statement is true by giving points (1-99)
- Number of points = the probability the statement is true/false
- Complementary predictions are paired – the winner gets 100 points

L.E.M. nano - example

Will there be a prototype of graphene filament that can be used in 3D printing?

L.E.M. nano - example

Will there be a prototype of graphene filament that can be used in 3D printing?

- User 1 – yes, 80% it will be true – 80 points **YES**

L.E.M. nano - example

Will there be a prototype of graphene filament that can be used in 3D printing?

- User 1 – yes, 80% it will be true – 80 points **YES**
- User 2 – no, I think for now it is not possible, but maybe... – 20 points **NO**

L.E.M. nano - example

Will there be a prototype of graphene filament that can be used in 3D printing?

- User 1 – yes, 80% it will be true – 80 points **YES**
- User 2 – no, I think for now it is not possible, but maybe... – 20 points **NO**
- The decision – NO, there is no such prototype

L.E.M. nano - example

Will there be a prototype of graphene filament that can be used in 3D printing?

- User 1 – yes, 80% it will be true – 80 points **YES**
- User 2 – no, I think for now it is not possible, but maybe... – 20 points **NO**
- The decision – NO, there is no such prototype
- They get:
 - User 1 – nothing (loses 80 points)
 - User 2 – 100 points (wins 80 points)

Summary

- CIAMSE
 - Development of industrial mathematics in Poland
 - Popularization of science & mathematics
 - Various projects from many fields of interest

Summary

- CIAMSE
 - Development of industrial mathematics in Poland
 - Popularization of science & mathematics
 - Various projects from many fields of interest
- L.E.M. nano
 - First prediction market in Poland
 - Industrial Development Agency & CIAMSE
 - Nanotechnology, graphene, disruptive technologies
 - Predicting possible ways of technology development

Thank you!