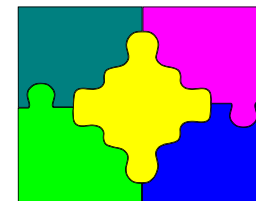


Doing industrial mathematics in Poland using the British experience

Kamil Kulesza

e-mail: Kamil.Kulesza@damtp.cam.ac.uk

Partners

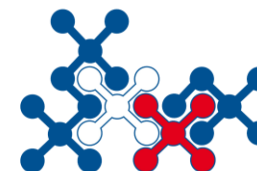


UK Science and Innovation Network

CAMBRIDGE PYTHON



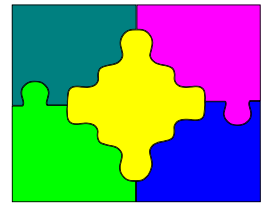
PORTAL RYNKU PRACY



Krajowy Punkt Kontaktowy
PROGRAMÓW BADAWCZYCH UE

MILSTAR

Inspirations:



Organizers:



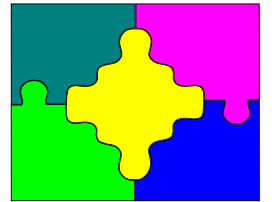
Instytut Matematyczny
Polskiej Akademii Nauk



Instytut Badań Systemowych
Polskiej Akademii Nauk



Wyższa Szkoła Informatyki Stosowanej i Zarządzania
pod auspicjami Polskiej Akademii Nauk
Warsaw Information Technology



Plan

- Foundations
- About team
- Projects
- Putting it all together

Foundations

- ❑ A personal perspective on mathematics and applications
- ❑ Moving between business and academia
- ❑ Polish vs British attitude



- ❑ Summer Research Practicals – first trials 2005, 2006

- ❑ CambridgePYTHON





1. ***„Academic institutions would be a very nice place to be if not all the students”*** - senior academic staff (on many occasions)
2. **Summer Research Practicals'08 example:**
 - > 110 applications (science, engineering, economics; grads & PhDs)
 - ~ 40 after qualification process,
 - < 20 were really working well
 - 5-10 stay in the team (some grads also do PhDs)
3. **Training and personal development**
 - a. ESGI
 - b. Individual visits (eg. Cambridge)
 - c. Intellectual stimulation and interesting problems to work on
 - d. Money – important, but secondary
4. **Results:** reliable & interdisciplinary team, out of the box thinking

About Team



$$\bar{P} = \sum_i P_i \alpha_i + \text{Term: } \Delta ? \text{ (FRA)} \rightarrow \text{Real}$$

INSOLVENCY

LIABILITIES vs ASSETS

PENSIOENING ASSURANCE
 REALISATION OF ASSETS

$$dS_i = \mu S_i dt + \sigma S_i dW_t$$

$$V_i = (V_{i-1} + (V_{i-1} - V_{i-2}))$$

$$P_{i+1} = 2P_i + P_{i-1}$$

$$\frac{\lambda}{1-\lambda} = \rho_n$$

$$E(z) = \frac{1}{1-\lambda} \sum_{n=1}^{\infty} \lambda^n z^n$$

$$E(z^2) = \frac{1}{1-\lambda} \sum_{n=1}^{\infty} \lambda^n z^{2n}$$

$$E(\epsilon_i^j \epsilon_t^j) = 0$$

$$E(R_m \epsilon_t^j) = 0$$

$$P_i = \beta_{0i} + \beta_{1i} X_{i1} + \beta_{2i} X_{i2} + \dots$$

Random

$$2 \frac{(P_{i+1} - P_i)}{P_i + P_i} + \dots$$

$$\ln \frac{P_{i+1}}{P_i}$$

VaR 99.5%

1st. model (BS?)

IPD - survey of (morality)

Rent of Capital

TR < TR

TR Rent
 TR Capital

Floor/As
 Vofficer

IPD

P, B, E

? mix return?

?

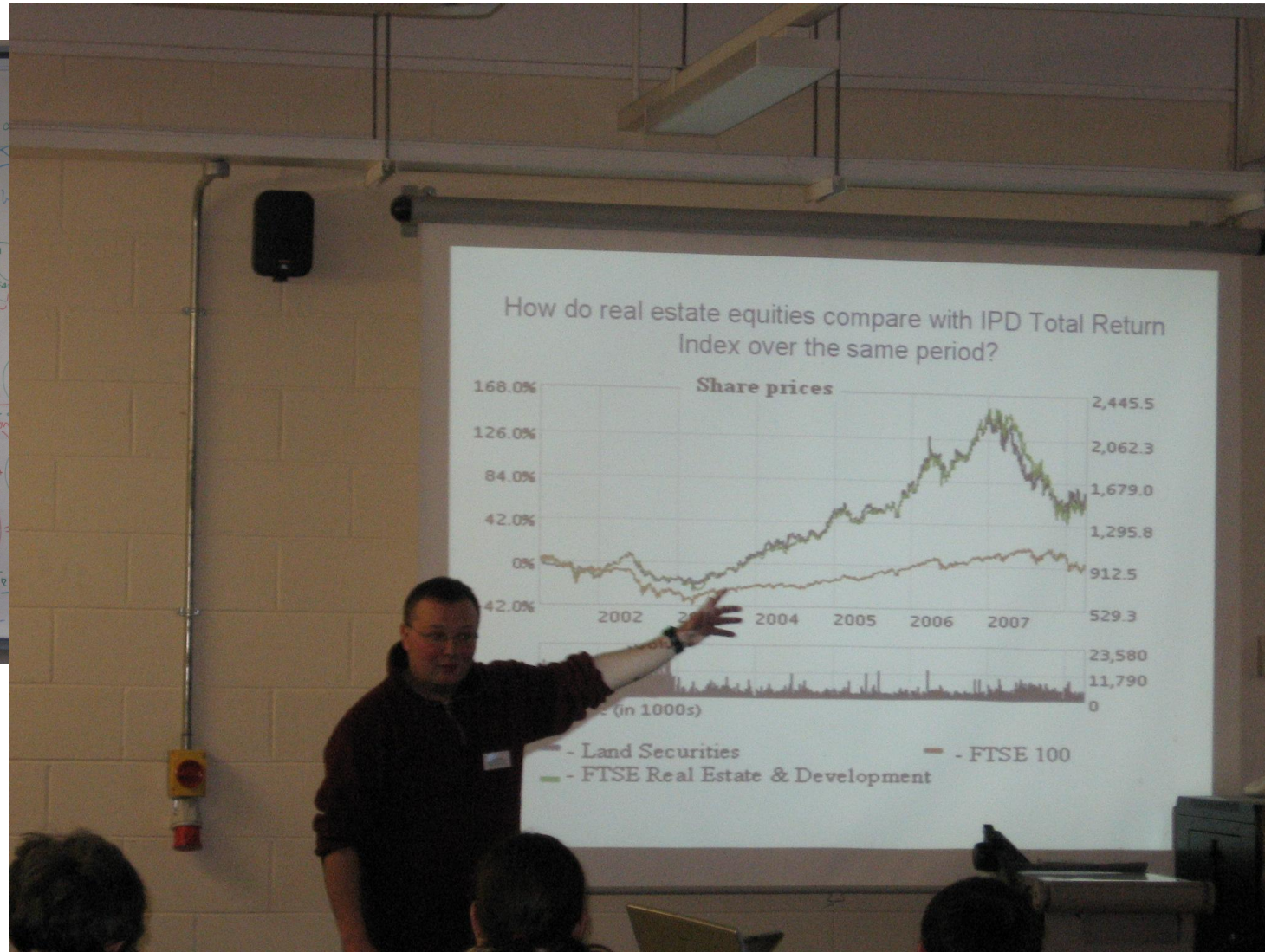
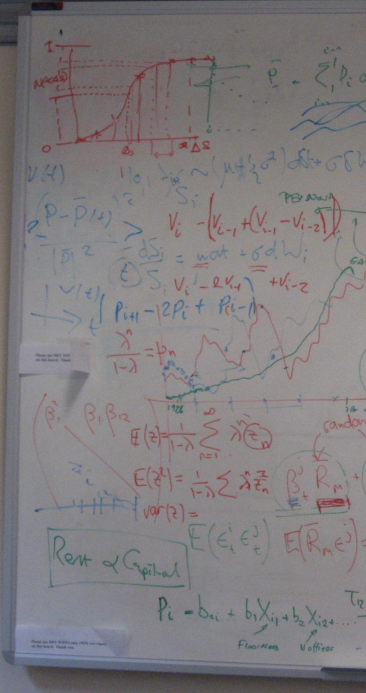
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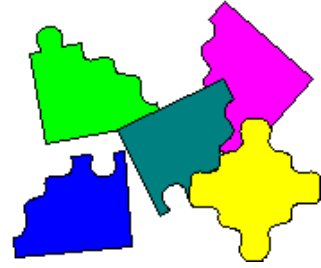




Case study:

UK commercial real estate volatility (64th ESGI)





□ Research (5 projects):

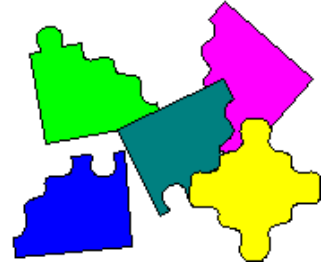
BiK: Bezpieczeństwo i Kryptografia, **Nano:** Nanotechnologiczne czujniki, **EWŚ:** Ekonomia Wirtualnych Światów, **DT:** Disruptive Technologies, **WRP:** Wirtualny Rynek Predykcyjny.

□ Industrial (5 projects):

PKP, KKP, VCR, CKK, RNA

(sorry no names, but *nondisclosure agreements* apply in some cases)

□ **Support (5 projects) e.g.:** project management, functional design mathematical sciences popularization

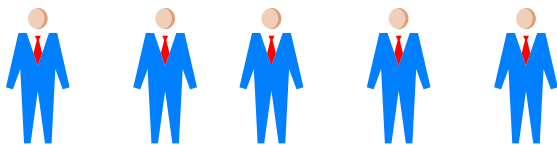
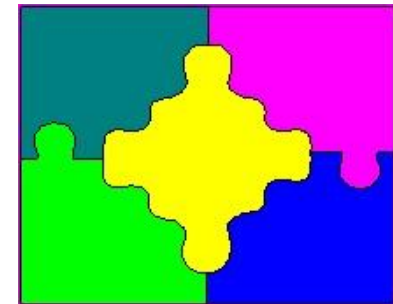
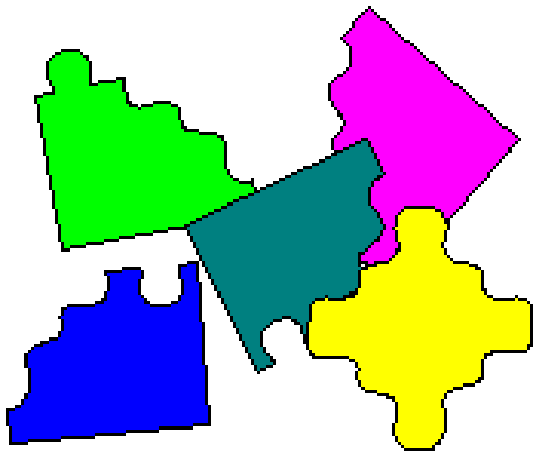


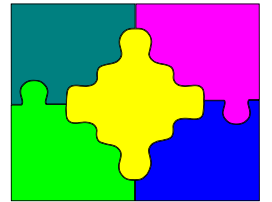
Case study: project CKK



- Impact of proposed new tax regulations on casinos' operators in Poland
- Systems' research and complex modelling: micro and macro, both cases few models
- Sound report and unbiased perspective
- Rising public awareness

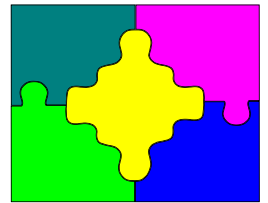
Putting it all together





We solve (real-world) problems

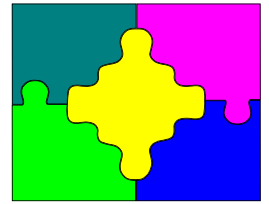
- Take the best from academia and business
- Interdisciplinary approach
- Mathematical reasoning
- Out of the box thinking



Benefits for industrial participants

- The solutions developed in the course of cooperation
- Rising public awareness to problems vital for industrial counterpart
- Establishing close working relation with academic community on multiple levels (students, researchers, senior researchers)
- Sending a clear signal to a number of potential employees about the kind of problems that the company deals with

Putting it all together



Tomorrow - special lecture on:

„Mathematics, Engineering and Industry”

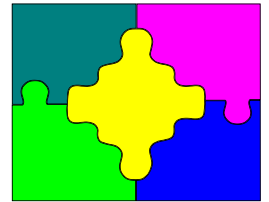
Time: Wednesday, 19th November 2008, 2 p.m.

**Venue: Warsaw University of Technology,
main building (Plac Politechniki 1), room 208.**

Details: www.CambridgePYTHON.pl/wyklad

Organizer:


CAMBRIDGE PYTHON



Future activities:

- **CIA** – Centre for Industry and Applications (Institute of Systems Research)
- Summer Research Practicals 2009
- Modelling week VIII'09 (prof. Wojciech Okrasiński, Wrocław)
- European Study Group with Industry in Poland (2009?)

To support us or join us e-mail

CIA@ibspan.waw.pl