# The role of R&D networks in strengthening knowledge base and S&T capabilities

The case of
Regional University Knowledge Centre for Vehicle Industry

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Globelics Academy, 2-13 June 2008, Tampere

# Overview

- Theoretical background
- Research question, methodology
- Case study
  - Background information
  - Structure and characteristics of R&D collaborations of the firms
- Summary

# Theoretical background

Economic growth

fuelled by

Technology progress

fuelled by

Innovation

Innovation is an increasingly complex process just like knowledge production that feeds innovation

Growing number of R&D collaborations

*„….innovation is most effectively undertaken as a collective process in which networks play a central role."*

Fagerberg 1994, Link & Siegel 2001

OECD 2003

Griliches 1992, Fagerberg et al. 2004

Kline & Rosenberg 1986, Lundvall 1992, 2004, Gibbons et al. 1994

Hagedoorn 2000, '02

Özman,2006

# Selected theoretical approaches

- Evolutionary economics
(Nelson & Winter 1982, Dosi 1988, Dosi 2000)
- 'System of innovation' approach
(Nelson 1993, Edquist 1997, Cooke et al. 1997, Malerba & Orsenigo 1997)
- Knowledge-based economies
(David & Foray, 2001; Archibugi & Lundvall, 2002, Castells, 1996)
- Taking into account the social environment: embeddedness, social capital (network capital), structural holes, trust, actor-network theory…
(Granovetter, 1973, '85, '91, Coleman 1990, Burt 1992, Callon 1990, Sako 1992, Nooteboom 1997, '99,
- Social network analysis (SNA):
systematic collection of relational data, study of the flows through the network, graphic images, mathematical or computational models
(L Freeman 2004, J. Scott 2000, Wassermann & Faust 1994)

# Research questions

- *What are the main characteristics of R&D and innovation networks in Hungary?*
- *How and how much could the Hungarian companies benefit from these collaborations?*
- *Is there any national specificity behind the overall low level of collaborative activities?*

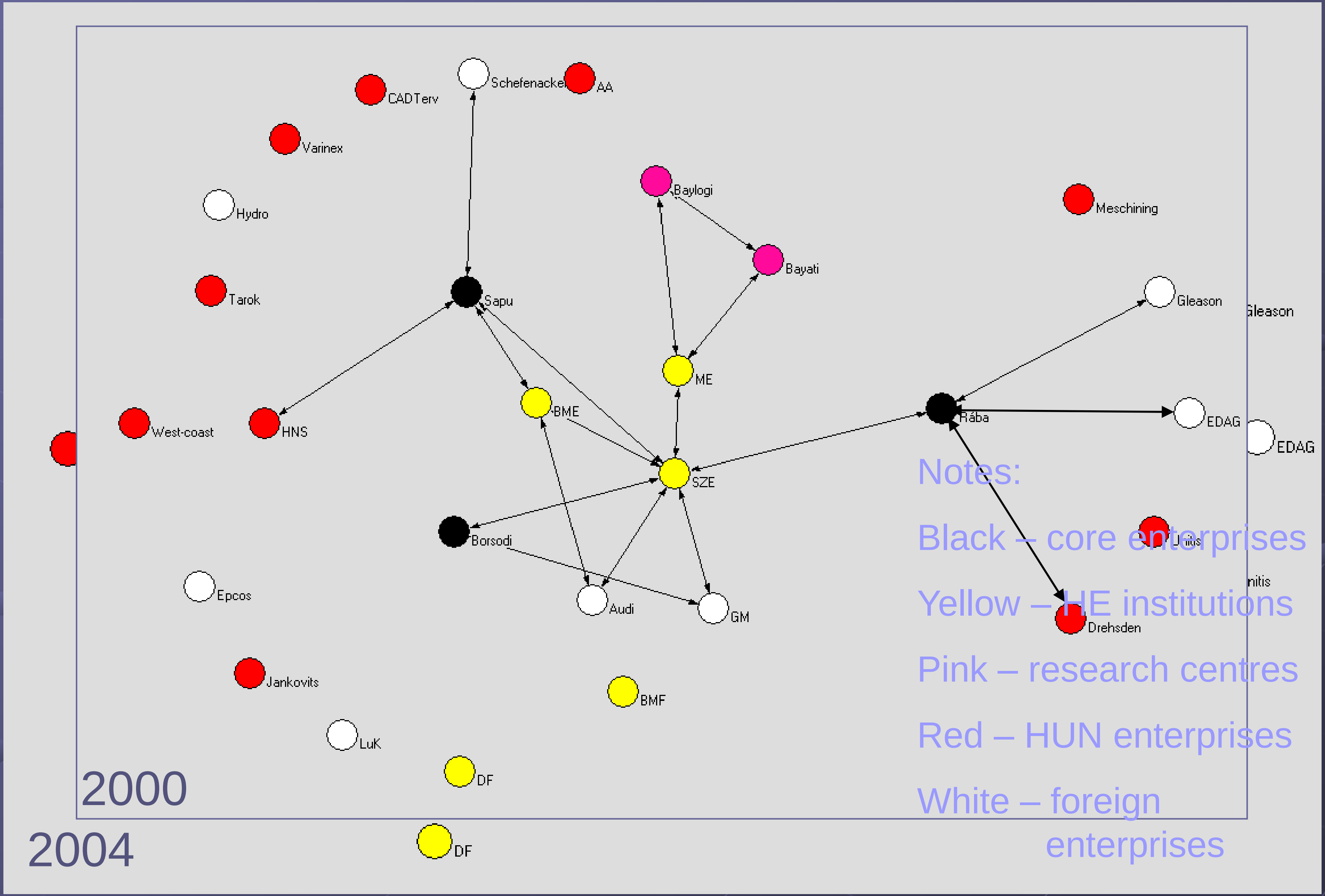
# Research methodology

- Literature review
- Case studies (2-2 in 2 different industries) with ***structured interviews***
  - General information on the organization (ownership, R&D activity, market situation)
  - R&D networking (partners, influencing factors, characteristics, output/outcome)
  - Specificities of Regional University Knowledge Centre
  - Experiences with R&D networking
  - (Slightly modified for faculties / enterprises)
  - (Complemented with table & graph to fill in)
- Social network analysis
- Data analysis (problem of availability, reliability)

# Case study introduction

- Target firms: Borsodi Ltd, Rába Axles Ltd, Sapu (VisioCorp) Lp.
  - They form together with the ‘Széchenyi István’ University the Regional University Knowledge Centre for Vehicle Industry (JRET)
  - ***Focus on their R&D&I collaboration network within and outside JRET***
- Environment
  - Northwestern Hungary
  - Automotive industry
  - PANAC automotive cluster
- Government support for R&D&I collaborations
  - Regional University Knowledge Centres

# Development of a network




Notes:

Black – core enterprises

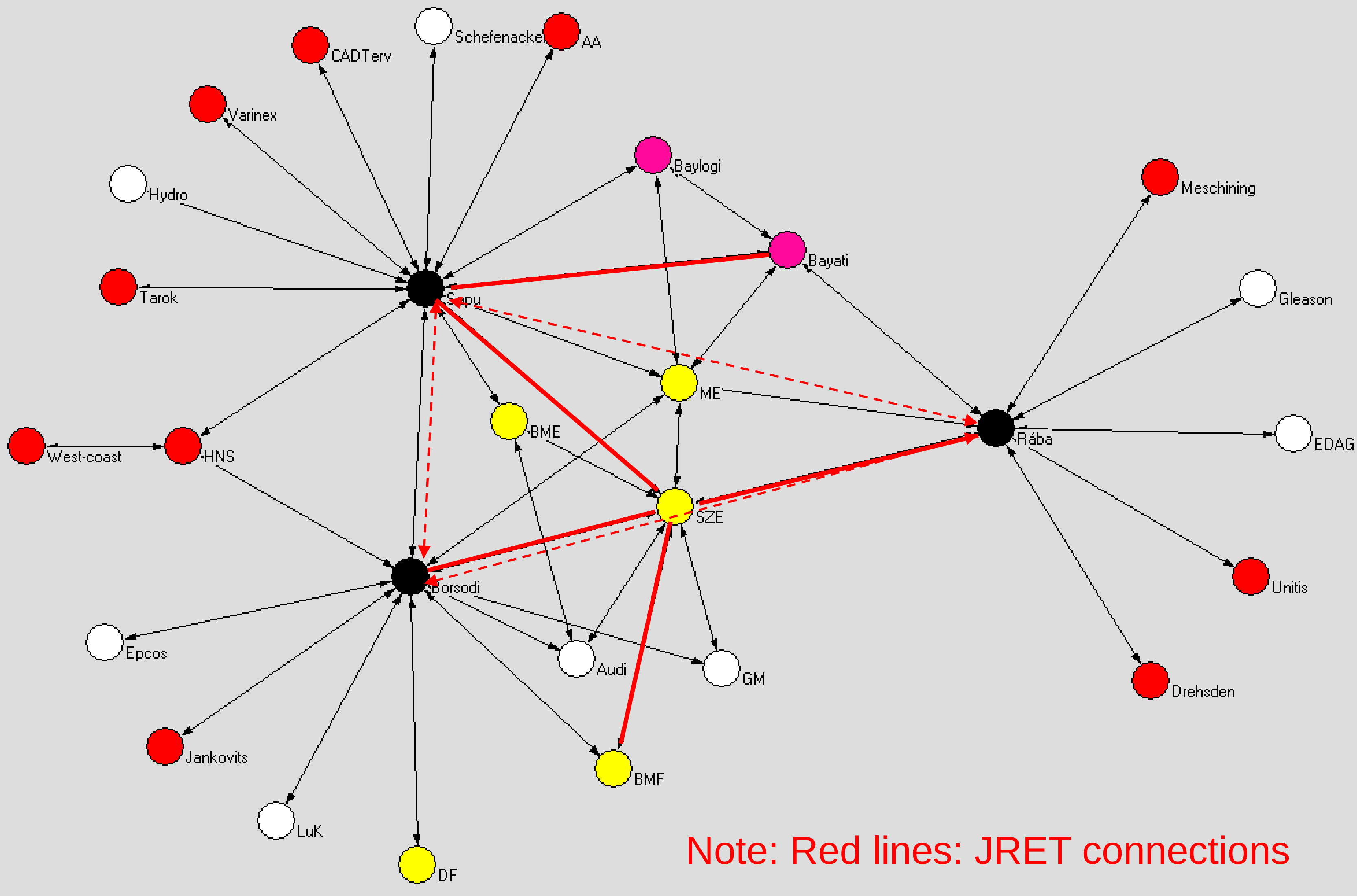
Yellow – HE institutions

Pink – research centres

Red – HUN enterprises

White – foreign enterprises

# Basic structure of the R&D network



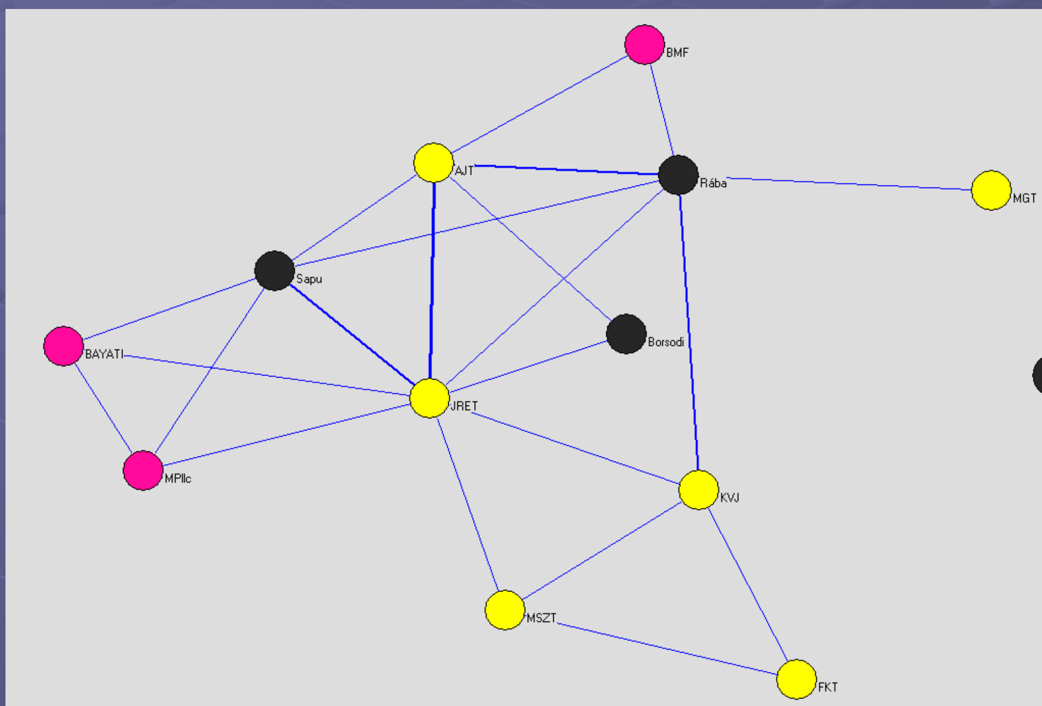

Note: Red lines: JRET connections

# Basic structure of the R&D network

- Three relatively insular circle of partnerships
  - Combination of different knowledge bases (so far unexploited)
- Partnerships are mainly based on bilateral contracts
- HE institutes are ‘in the middle’ of the activities, they provide broad background knowledge
- Large MNCs collaborate with universities
- JRET brought relatively little intensification or densification to existing partnerhsips

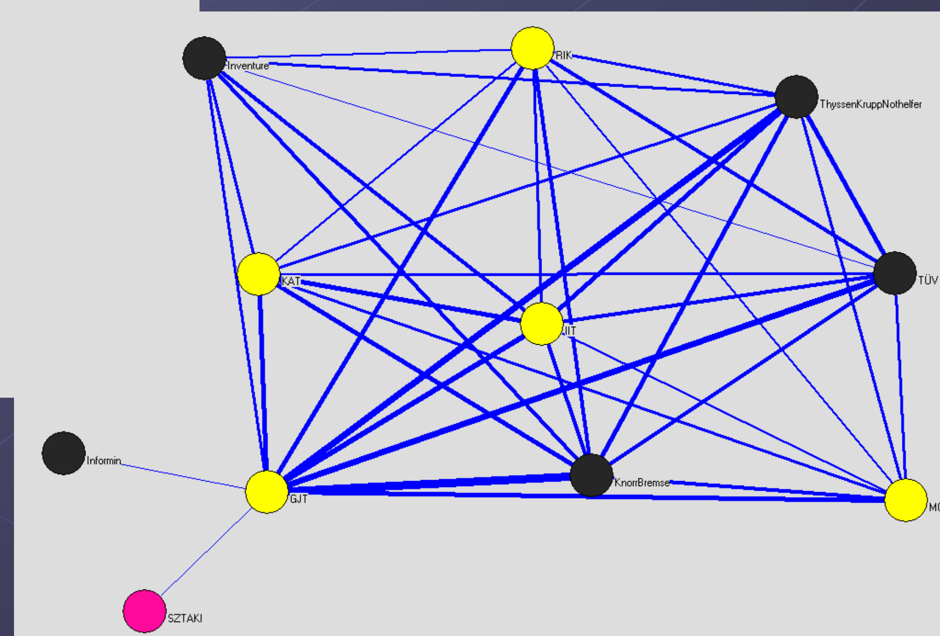
# Comparing different approaches in Regional University Knowledge Centres

JRET:



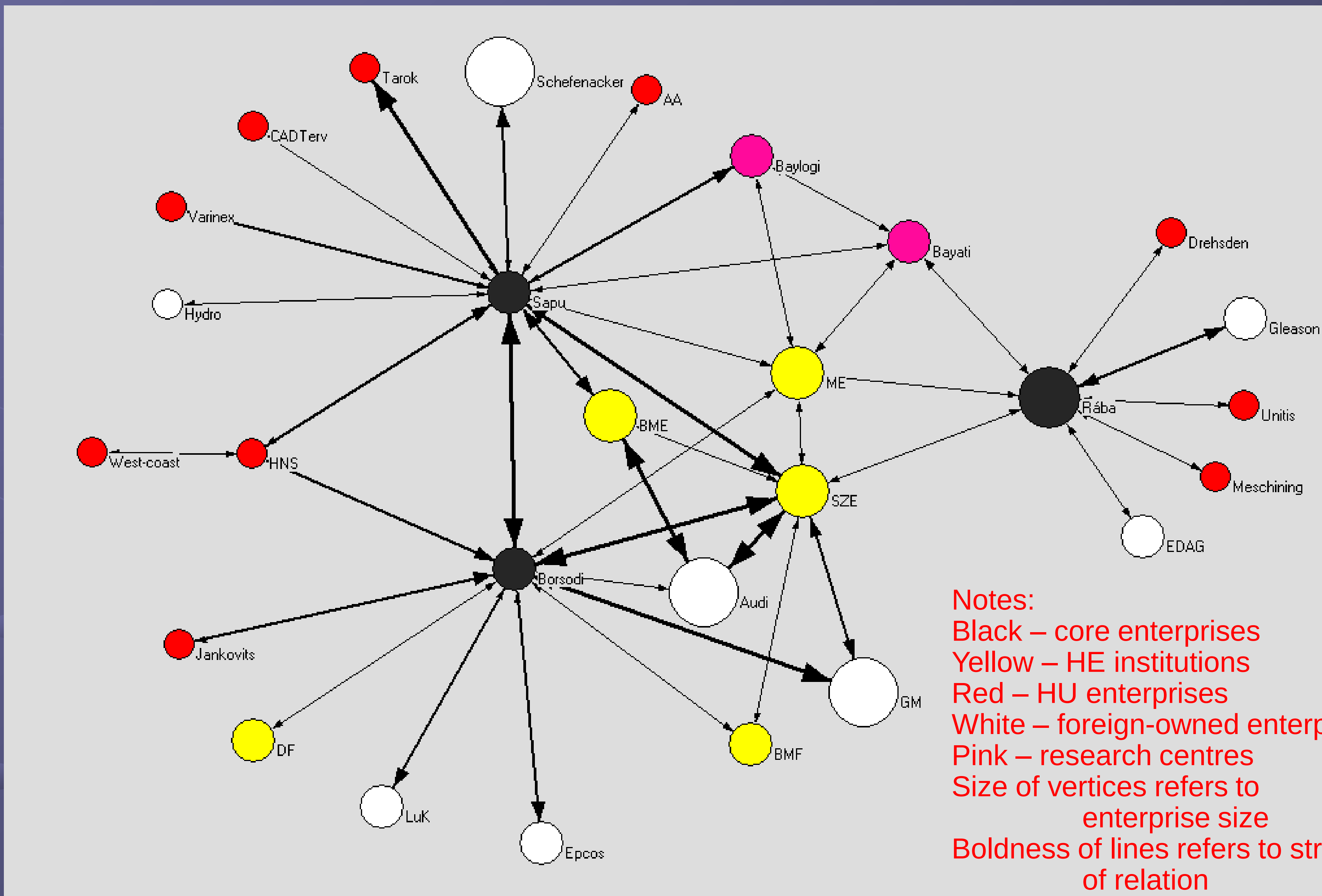

Source: Each RUKC's first year report

EJJT:




Notes:
Black – enterprises
Yellow – HE faculties
Pink – external partners / PRI

# Characteristics of the R&D network




Notes:
Black – core enterprises
Yellow – HE institutions
Red – HU enterprises
White – foreign-owned enterprises
Pink – research centres
Size of vertices refers to enterprise size
Boldness of lines refers to strength of relation

# Characteristics of the R&D network cont.'d

- Low density, ad hoc collaborations (lack of complex projects) but intention for durable linkages
- Importance of personal contacts but arms' length relations are maintained
- Rába Axles Ltd. is the less embedded of the three investigated enterprises, relying on intramural R&D
- Sapu Lp. mainly commissioning R&D tasks, now building own R&D capacity, strong local management
- Borsodi Ltd. is the most active, both commissioning and performing different R&D tasks, development by knowledge intensive activities

# Upgrading of S&T capabilities

- Lots of weak ties, big cognitive distance → modest benefits
- Raising awareness of R&D&I activities
- Knowledge accumulation (also about collaboration)
- R&D collaborations are judged by their contribution to competitiveness
- Quantifiable gains in cost savings, additional sales volume, in enhanced machinery and new job opportunities

# Emerging findings

- Lack of strategic view about R&D and R&D collaborations
- Large enterprises tend to rely on intramural R&D and require only special services
- Low R&D expenditures, very few complex projects emerge (and those mainly with governmental support)
- JRET contributes to stabilizing existing relationships but could not help in increasing the number of affected firms

# Thank you for your attention!

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