The Disko Survey

Detecting Patterns of Collaboration in Danish Manufacturing Firms

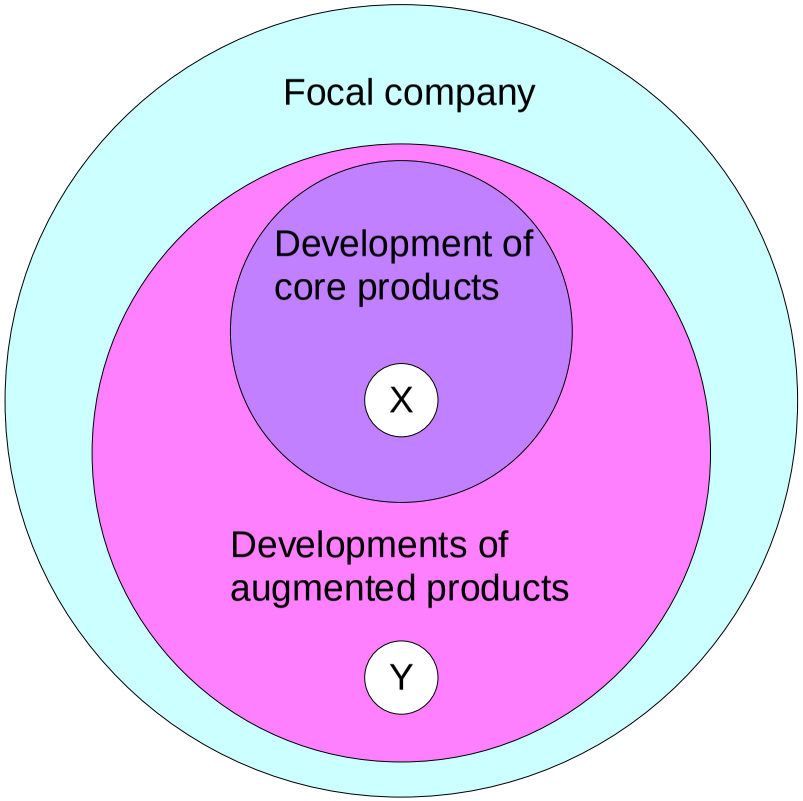
Overview

- Purpose of the study
- The data
- The method of analysis
- Some results
- Further perspectives (discussion)

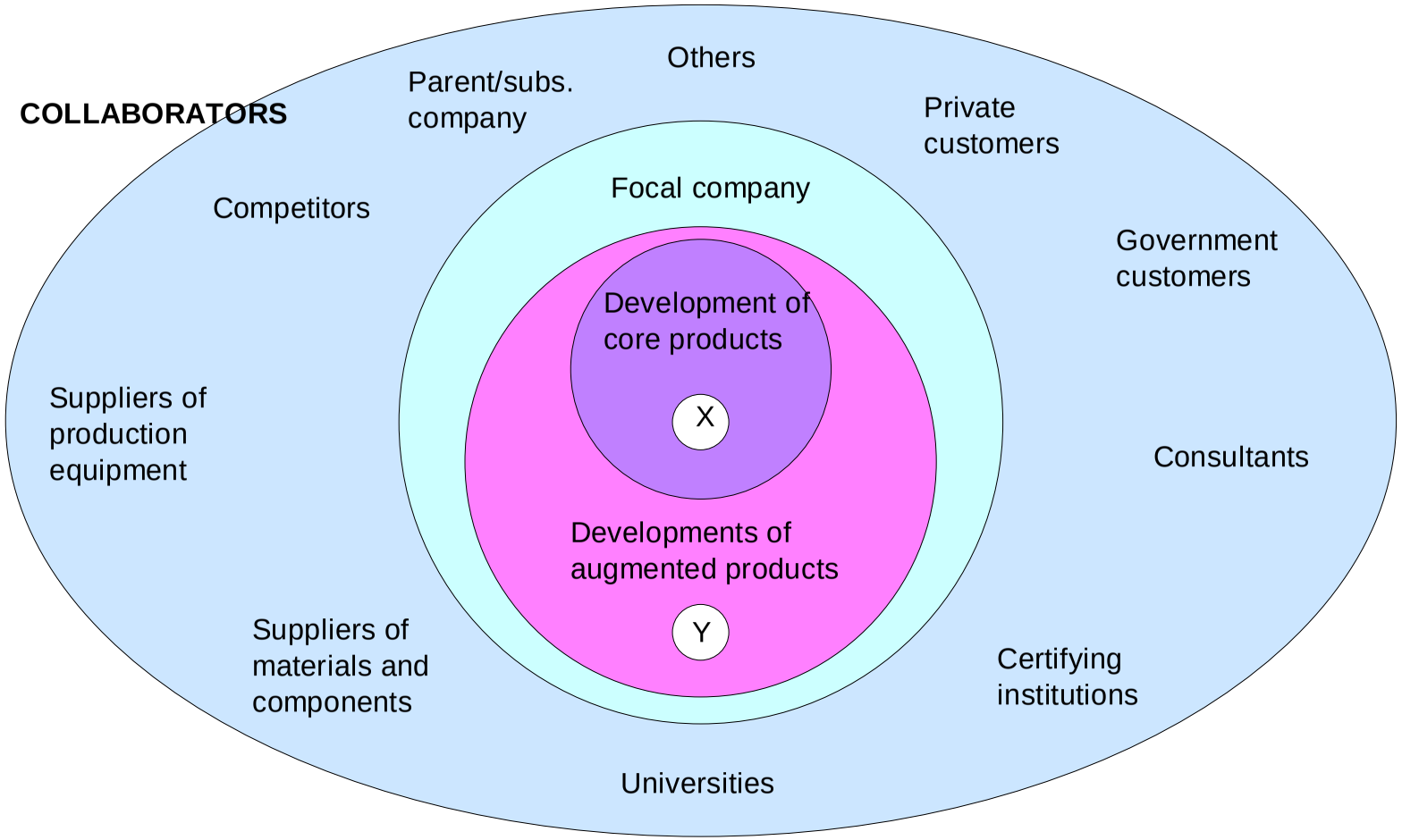
Purpose of the study

- to detect the **extent** and **patterns of collaboration**
- with **domestic** and **foreign partners**
- in the development of **core and augmented products**
- for the developing **company as a whole**
- and for a **specific development project**
- in **Danish** companies in the **manufacturing industries**

Purpose of the study



Purpose of the study



The data

- Population (sample frame)
  - Købmandsstandens Oplysningsbureau
  - CD Rom with 34,740 manufacturing industries (NACE codes [15..36])
  - firms with <10 employees and subsidiaries (branches) excluded => 6178 firms left
  - duplicate phone numbers excluded and SE-no. to be present => 5923 firms left

The data

- The sample
  - 6 initial call-backs, if no contact with firm
  - 1,346 firms contacted
  - 1,022 (76%) agreed to participate
  - 324 (24%) refused
  - elaborate procedure to establish contact with relevant informant

Some initial results

- Compared with industry codes no appearant biases are found in the data
- No weighting has been performed
- 46% of the 1022 firms has had no (physical) product development within the last two years
- the remaining 54% or 548 firms form the basis for the subsequent analysis of patterns of collaboration

The method of analysis

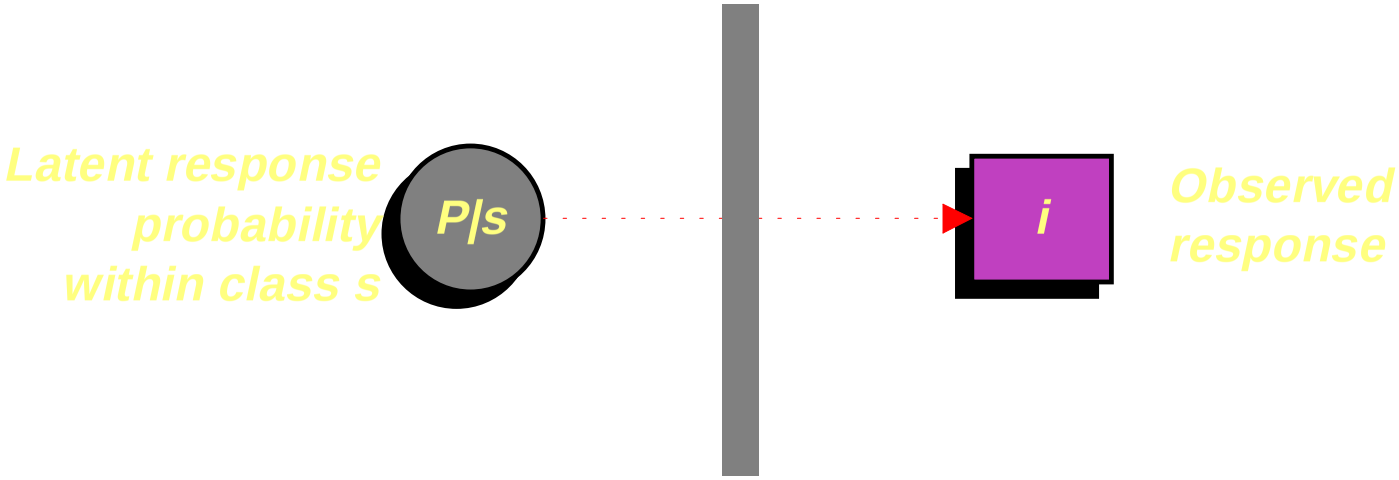
- Traditional methods:
  - a priori: industry groups, etc.
  - data driven: cluster analysis
- More recent approach:
  - model based clustering, based on statistical theory of finite mixtures

The method of analysis:

The latent class model

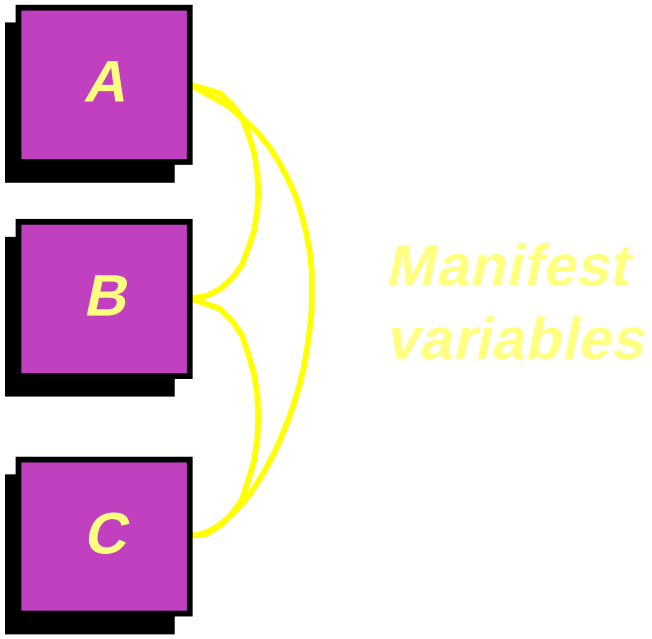
- a special case of the more general latent structure approach (Lazarsfeld and Henry (1969))
- a kind of factor analysis of qualitative measurements
- based on the concept of ‘statistical explanation’

Basic concepts in latent structure analysis



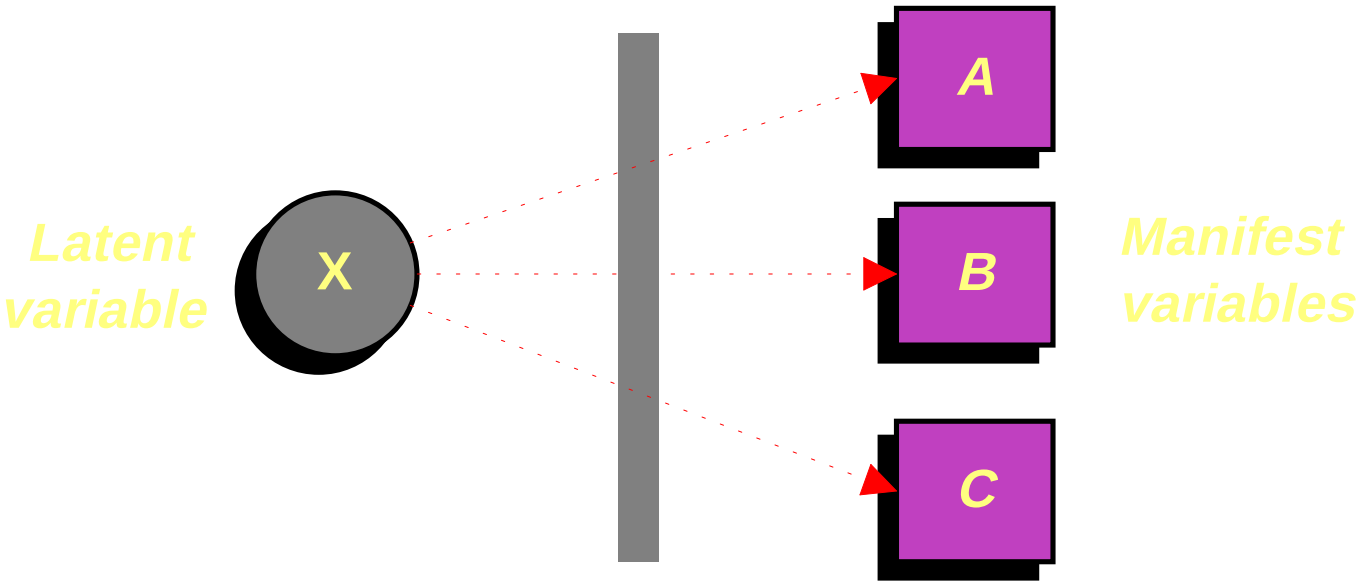
- the response is observable or manifest, but the response probability is unobservable or latent

Basic concepts in latent structure analysis



- ***When the manifest variables are analyzed, a significant statistical association exists, ...***

Basic concepts in latent structure analysis



- ***… but when the latent variable X is known and controlled for, the association vanishes or is 'explained'***

The latent class model applied to patterns of collaboration

- the observed links of collaboration are seen as *indicators*, reflecting an underlying, unobserved pattern
- basis for the pattern detection is the *probability* of a given link of collaboration, *not* the observation of the link itself
- the differences in link probabilities *across individual firms* can be described in a (few) number of *distinct patterns*
- the link probabilities *within each pattern* may vary *across different types of collaborators*

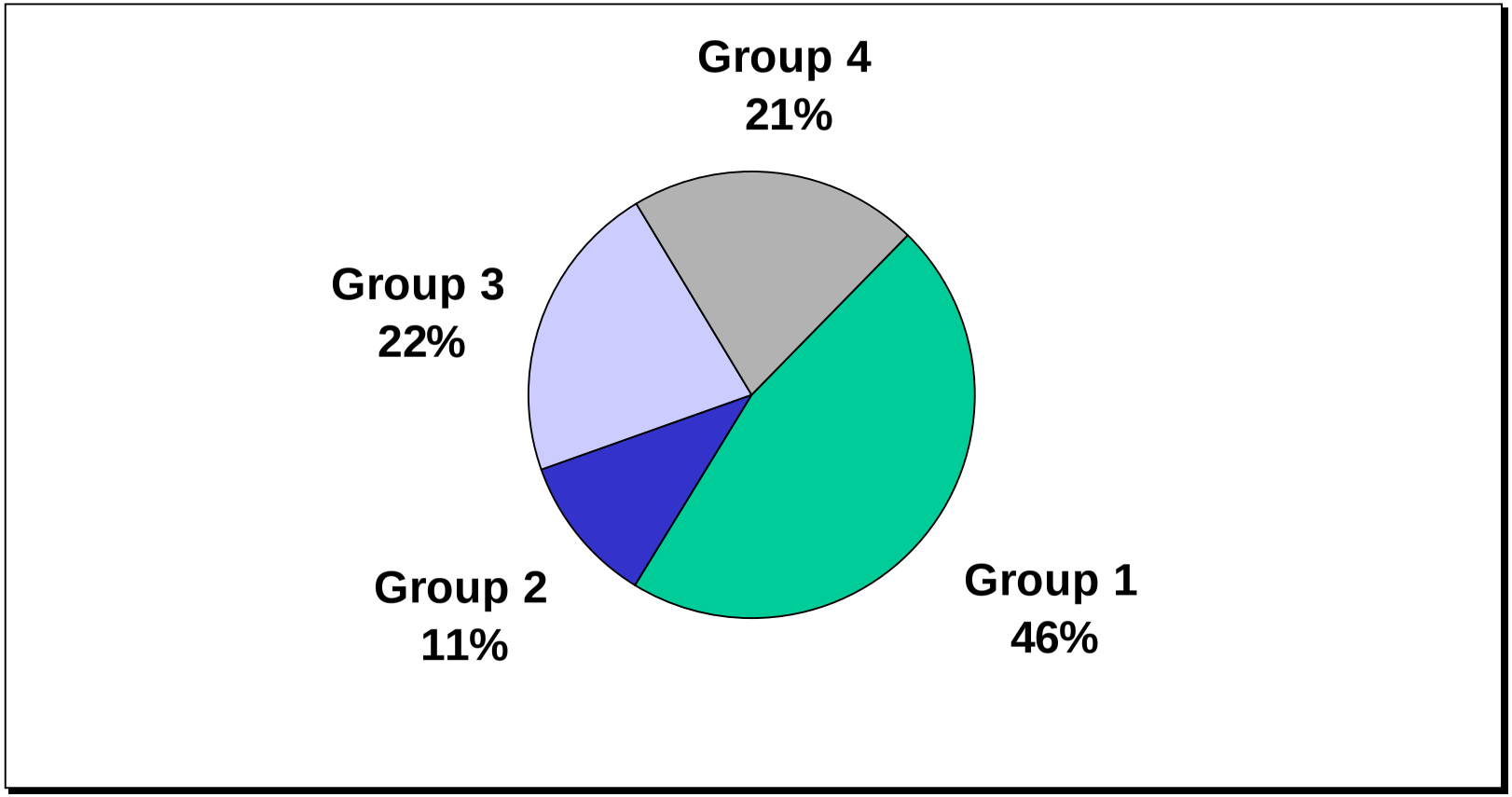
The latent class model applied to patterns of collaboration

- '*goodness-of-fit*' measures for model selection
- *number of reliably detected patterns*
- *the prevalence* of the detected patterns
- *pattern profiles*, i.e. the probability within each pattern that a given link of collaboration is found
- *individual 'recruitment' probabilities*, i.e. the probabilities of belonging to any detected pattern, given the individual links of collaboration

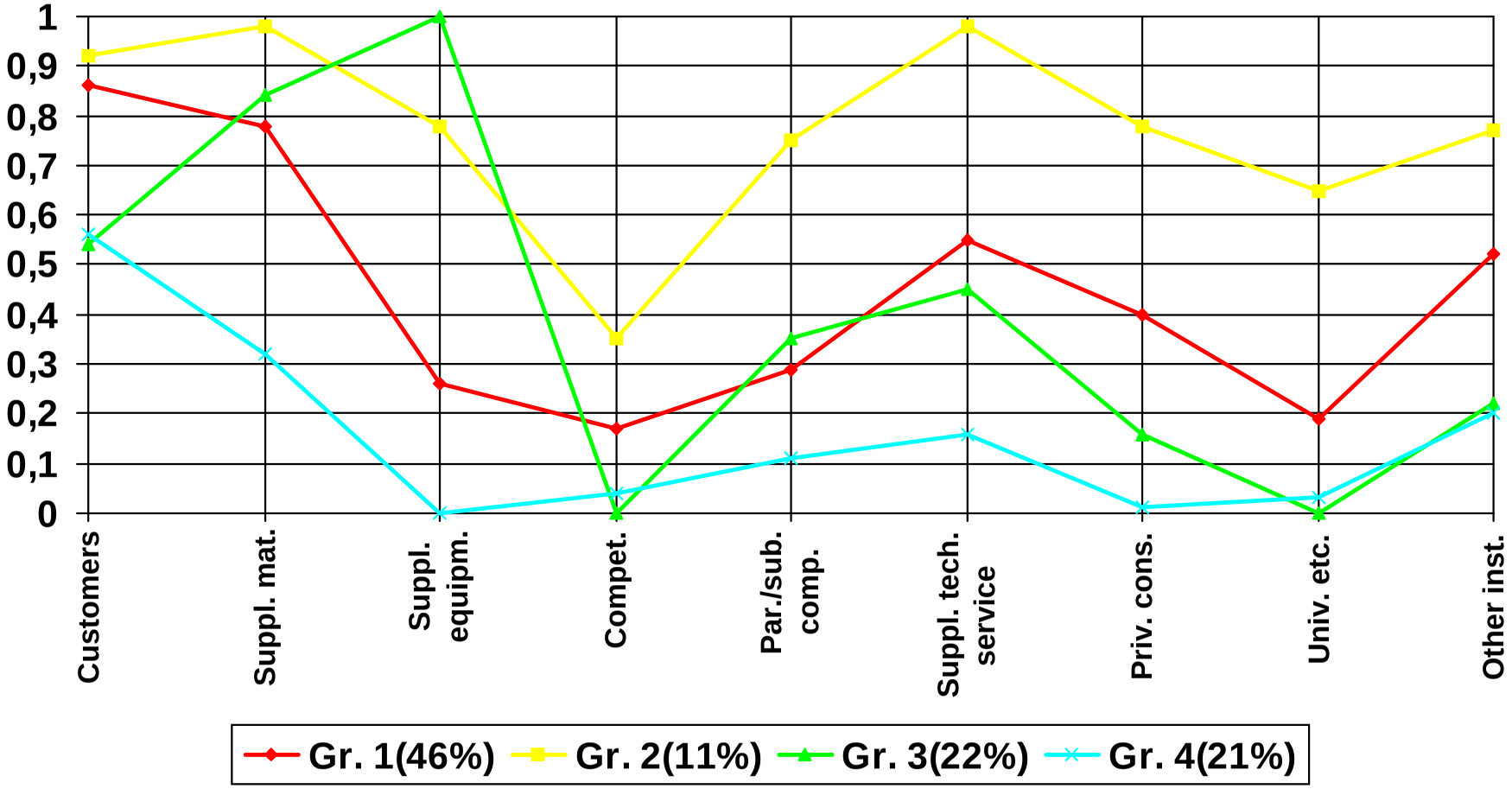
Patterns of collaboration Results

- Based on the firms entire set of collaborators in product development, four distinct patterns of collaboration can be reliably identified
- Based on the set of collaborators pertaining to a specific, important development project three distinct patterns can be reliably identified

Patterns of collaboration
Results: Firm level



Patterns of collaboration
Results: Firm level



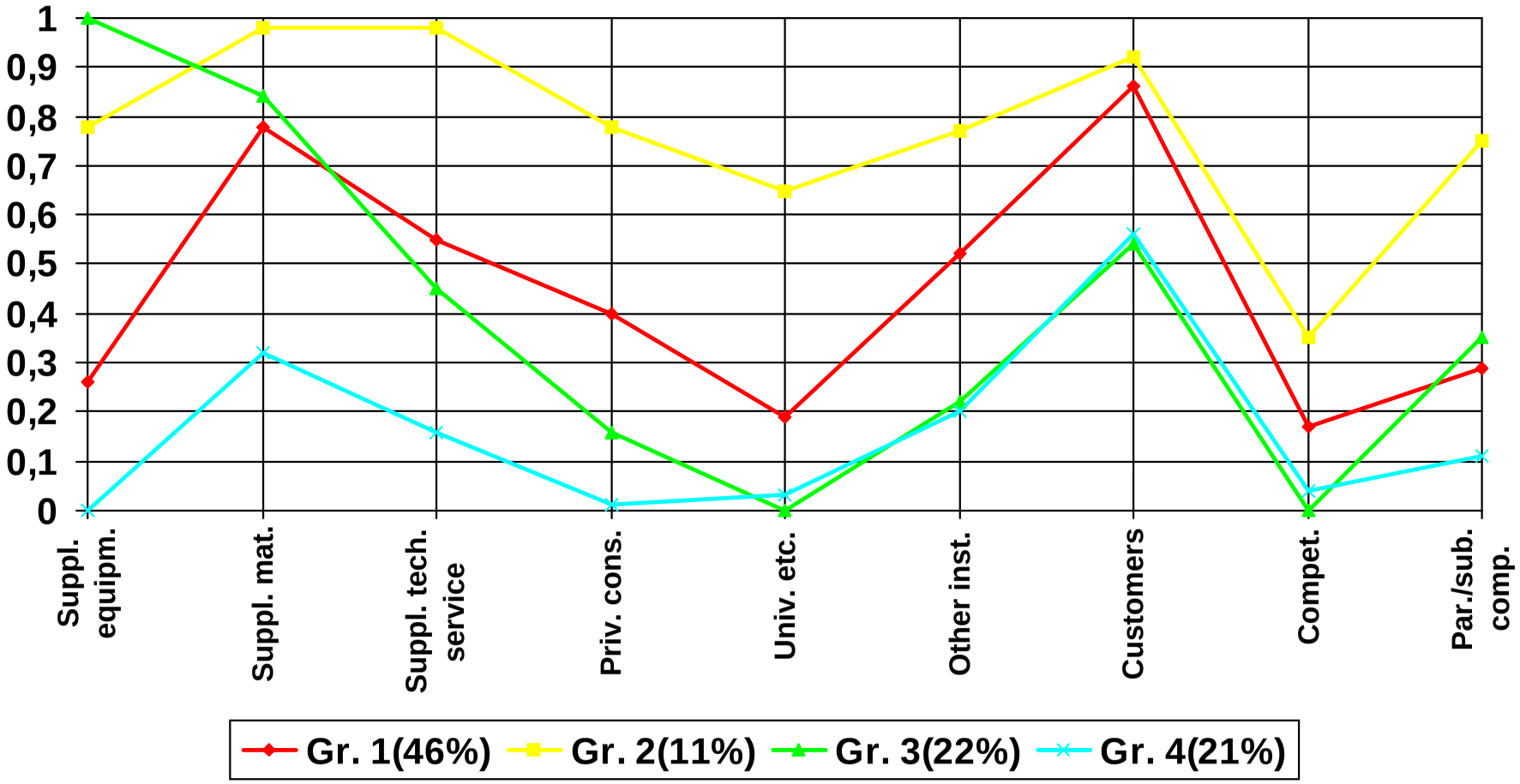
Patterns of collaboration
Results: Firm level

- Group 1 (46%) is basically the typical, middle-of-the-road pattern
- Group 2 (11%) represents the ‘high-profile’ company with a dense network of collaborators
- Group 4 (22%) collaborates basically with suppliers of materials and customers only
- Group 3 (21%) is interesting because of the cross-overs in profile. Companies here has an intense collaboration with up-stream firms.

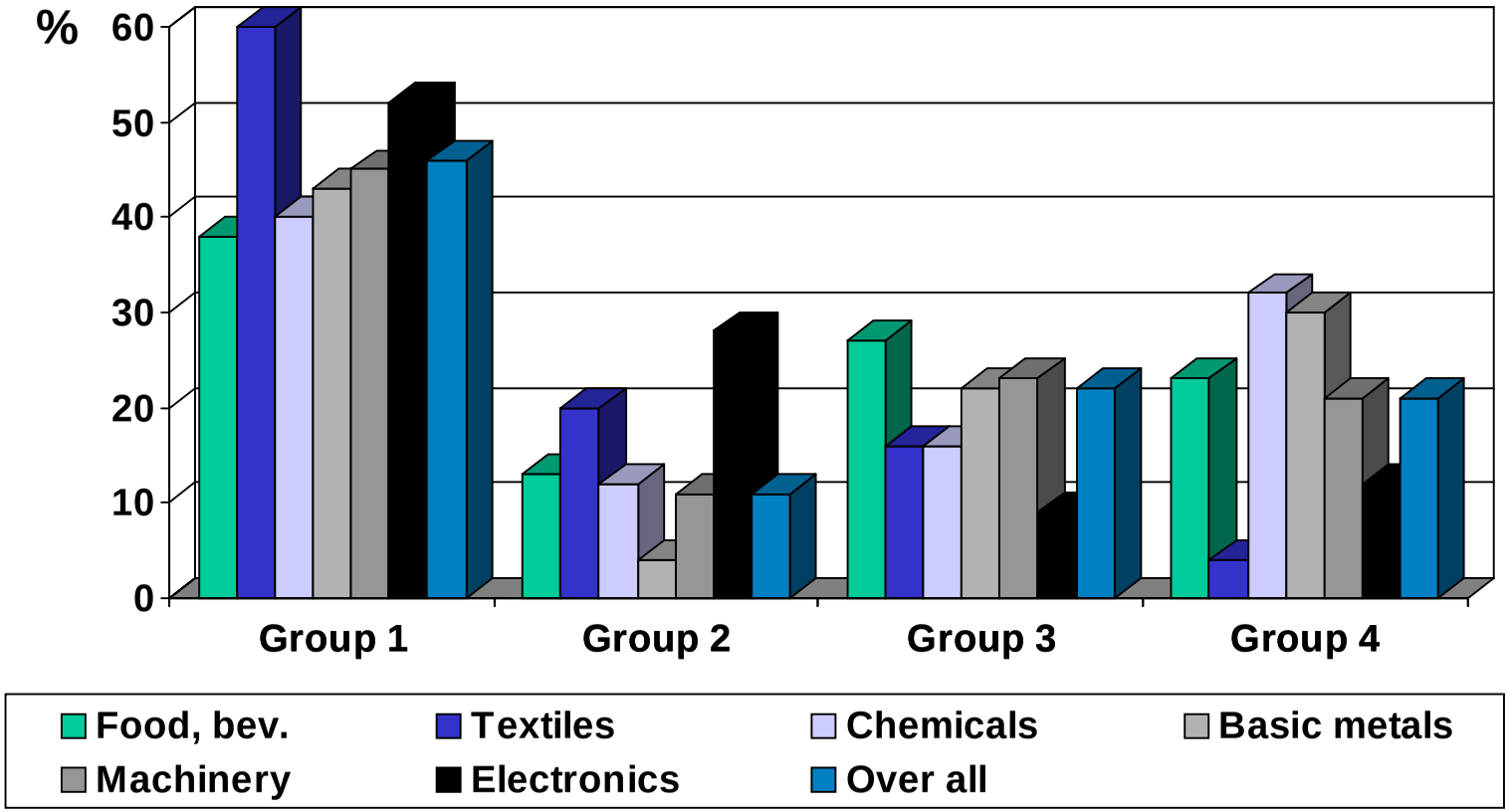
Patterns of collaboration
Results: Firm level

- On the next slide we have tried to sort (partially) the different types of collaborators according to their position in the value chain. A more clear picture appears.

Patterns of collaboration
Results: Firm level



Relating the patterns to other parts of the questionnaire



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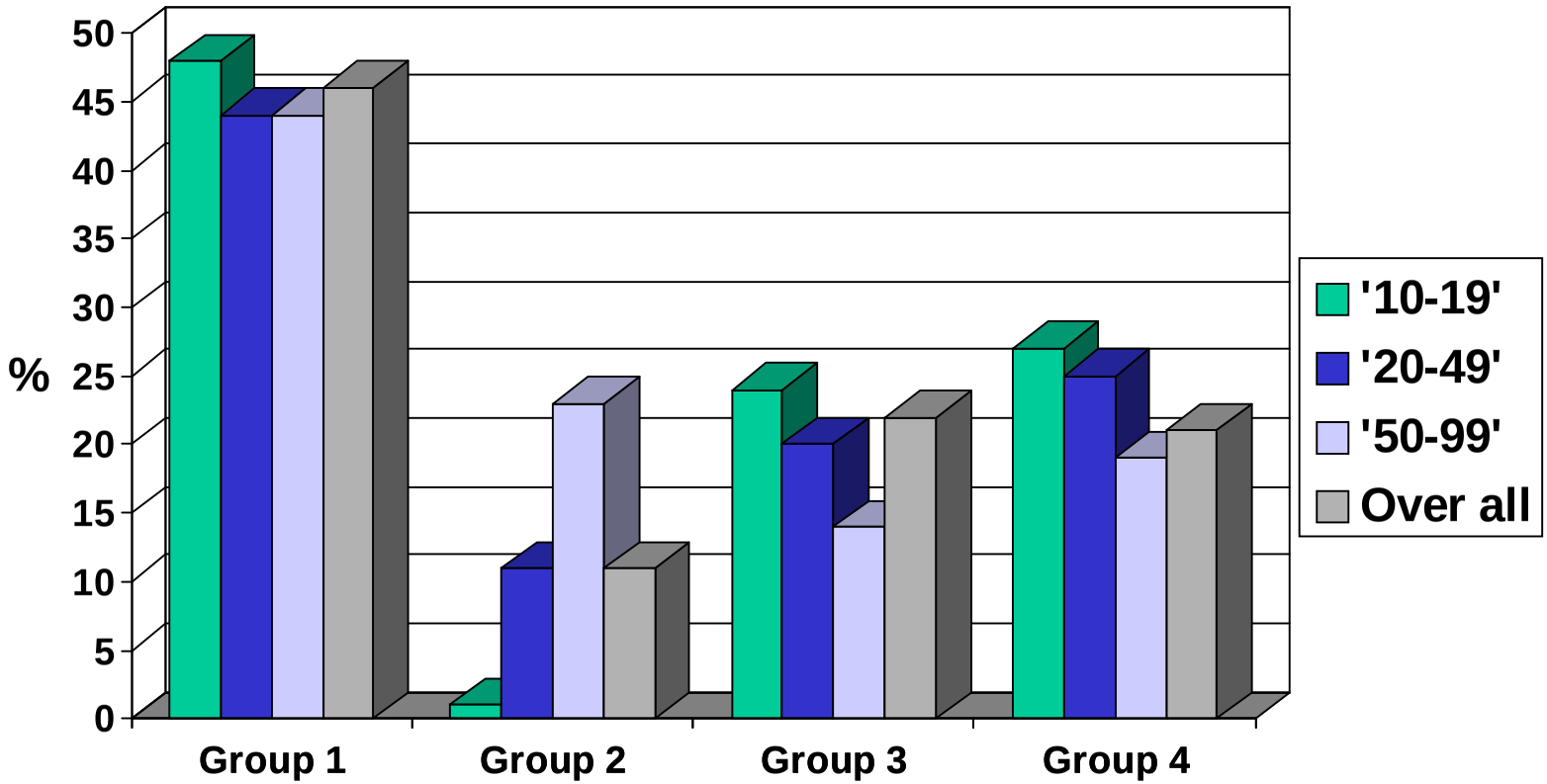

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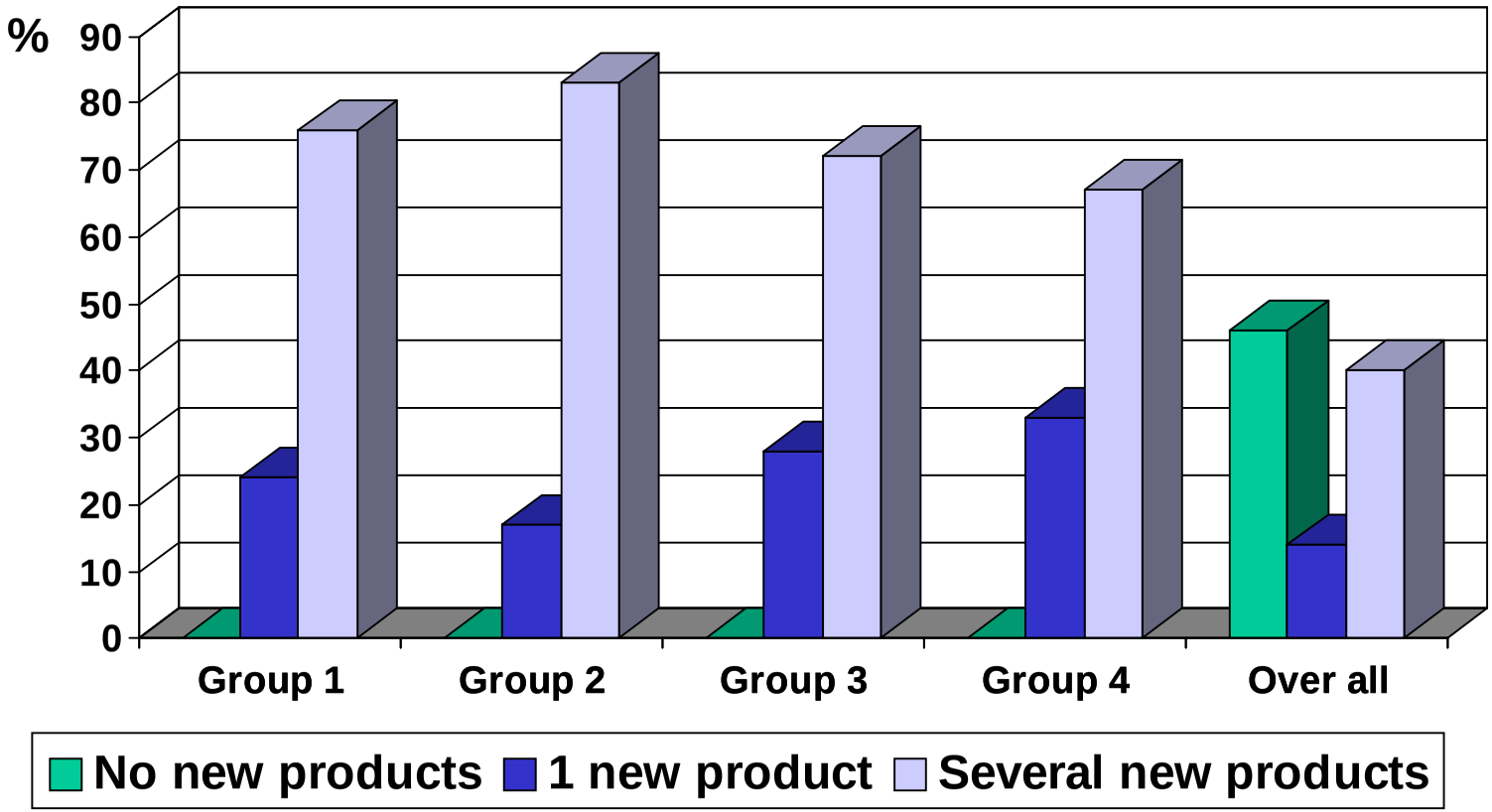

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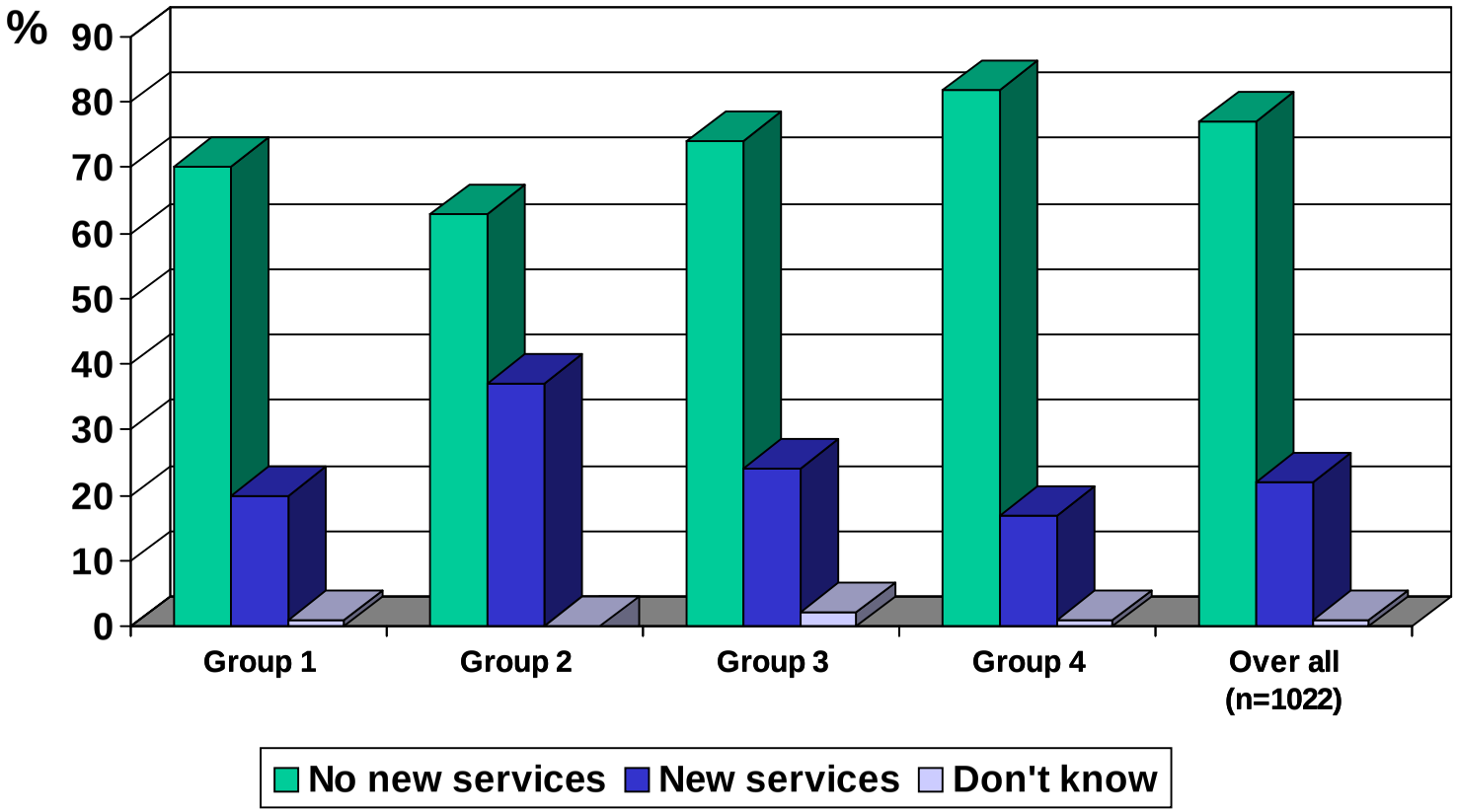

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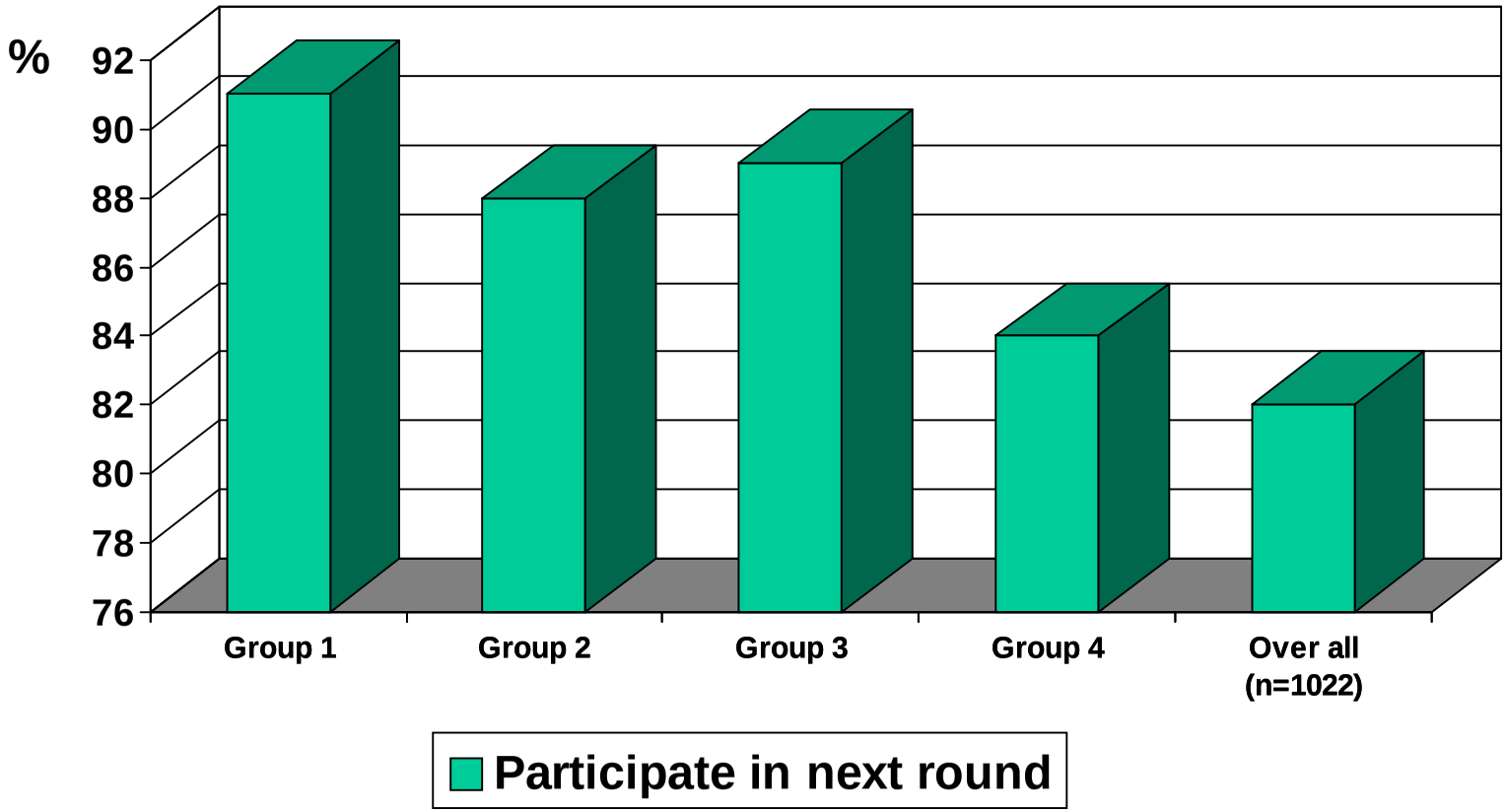
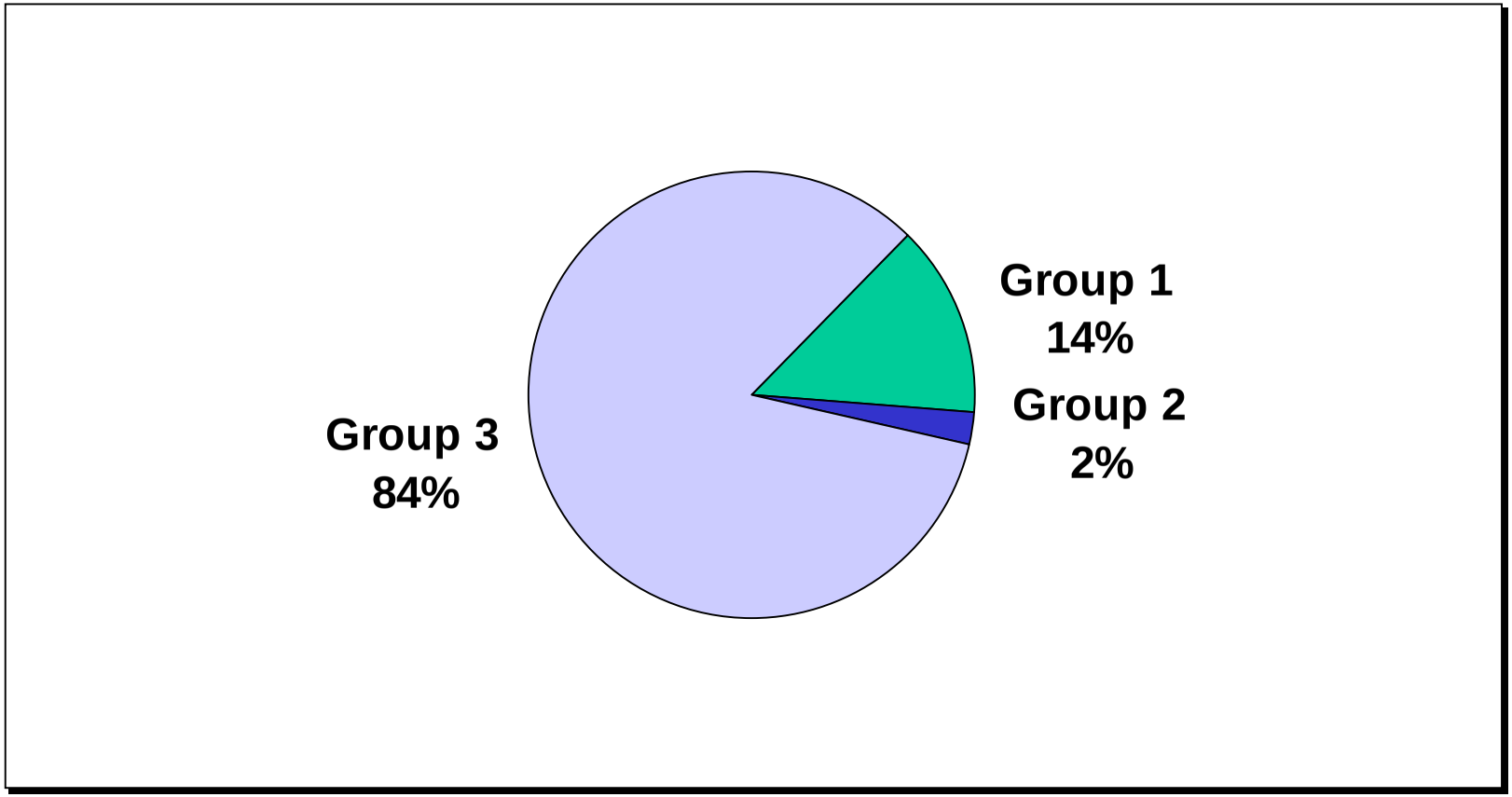


Patterns of collaboration
Results: Product level



Patterns of collaboration Results: Product level

- At the product level there seems to be less going on, i.e. less ‘variance to explain’
- Therefore fewer patterns can be reliably detected,
- and there prevalence is very skewed.
- This should be taken into consideration in future studies.