

The Disko Survey

Detecting Patterns of Collaboration in
Danish Manufacturing Firms

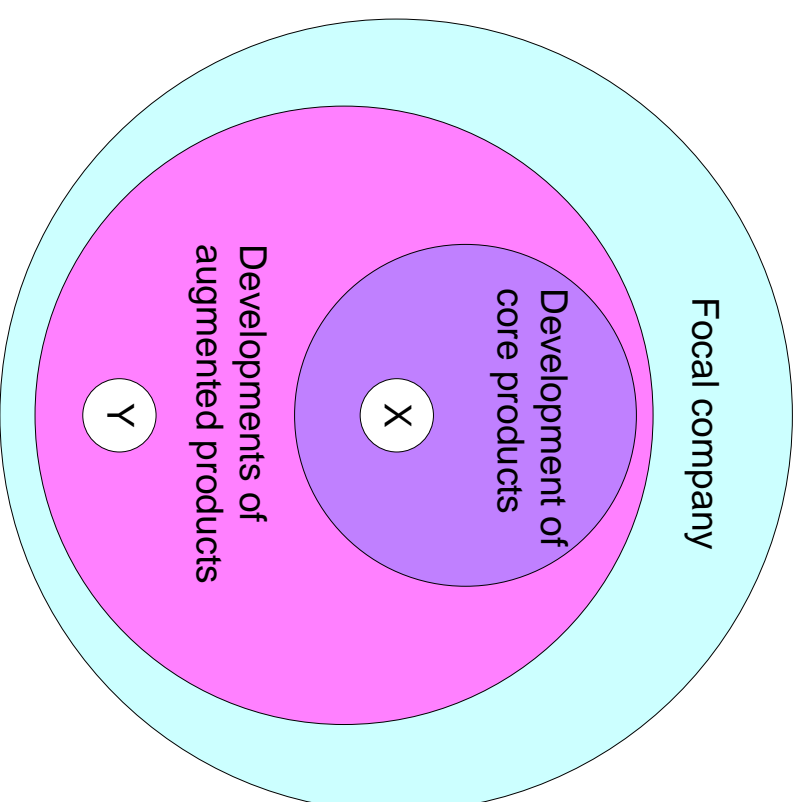
Overview

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

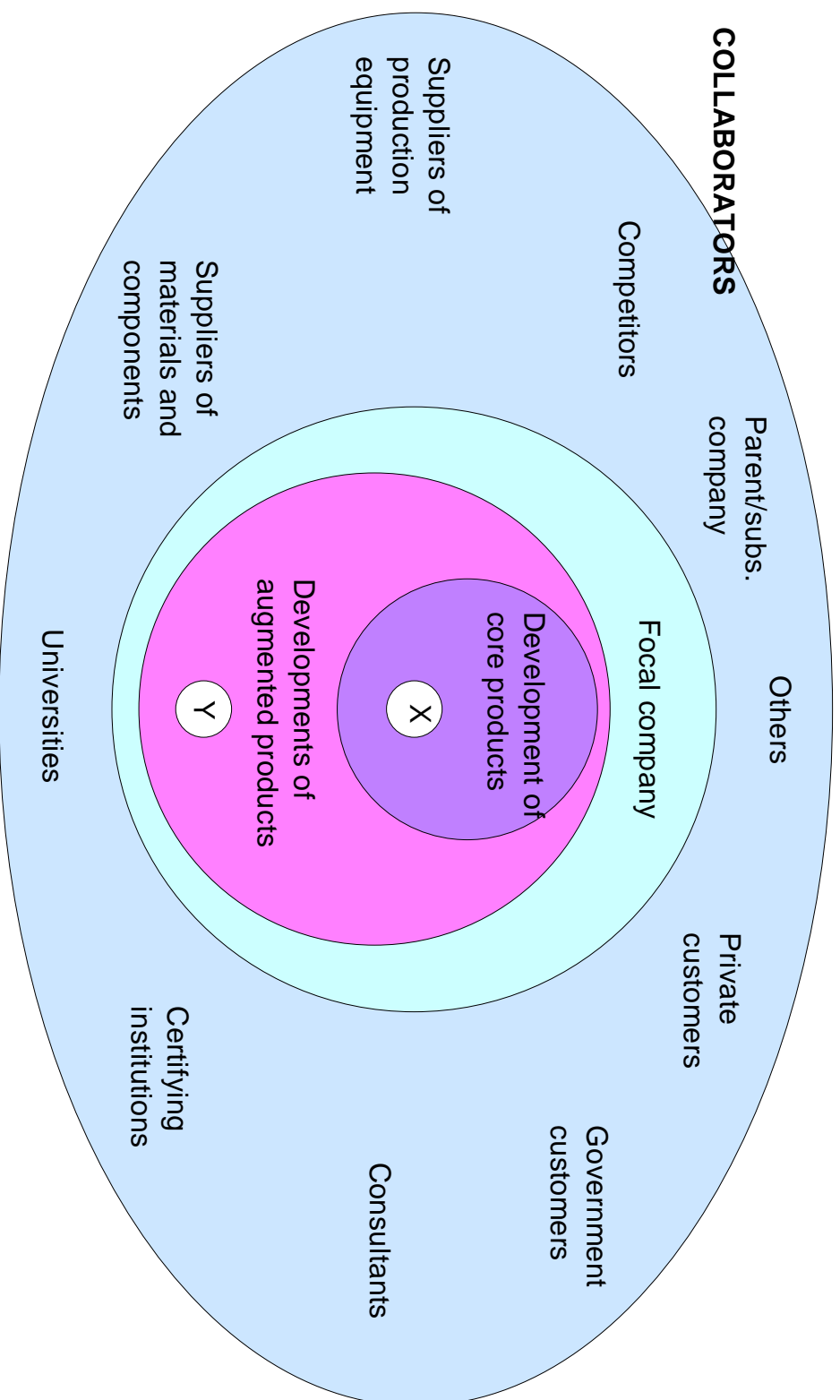
Purpose of the study

- 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 apparent 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

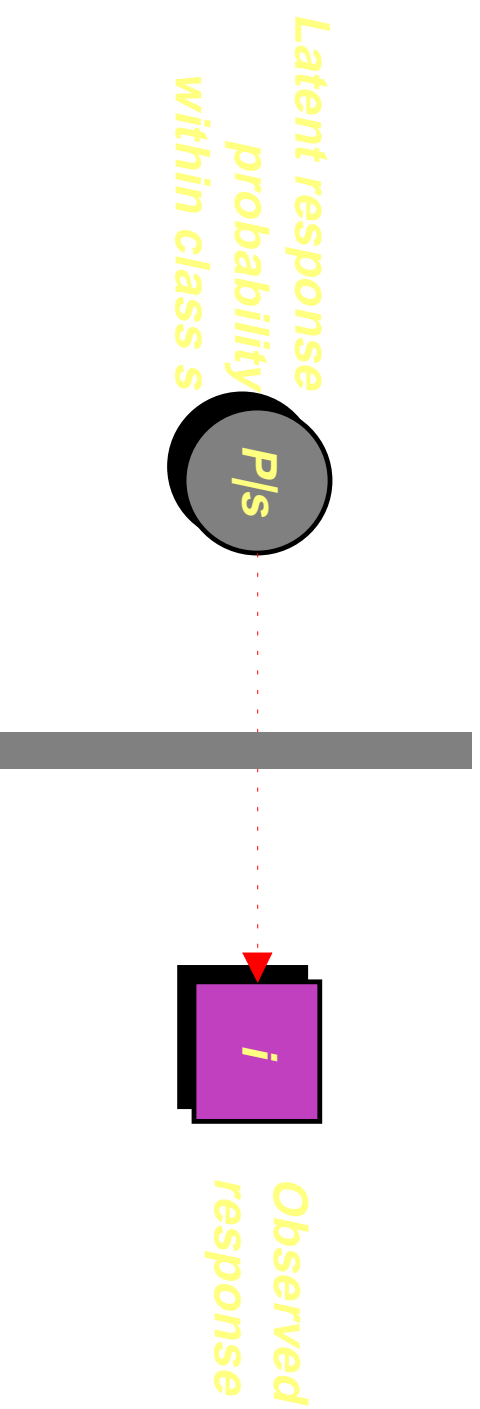
- Traditional methods:
 - a priori: industry groups, etc.
 - data driven: cluster analysis
- More recent approach:
 - model based clustering, based on statistical theory of finite mixtures

The method of analysis:

The latent class model

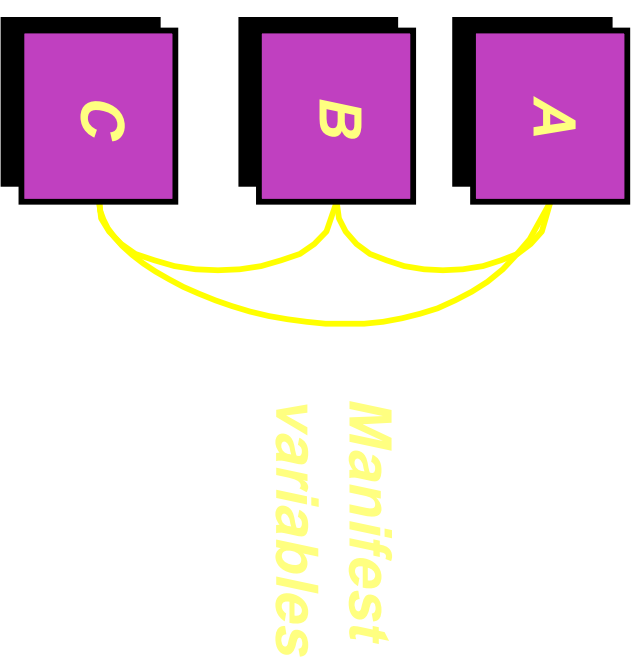
- a special case of the more general latent structure approach (Lazarsfeld and Henry (1969))
- a kind of factor analysis of qualitative measurements
- based on the concept of ‘statistical explanation’

Basic concepts in latent structure analysis



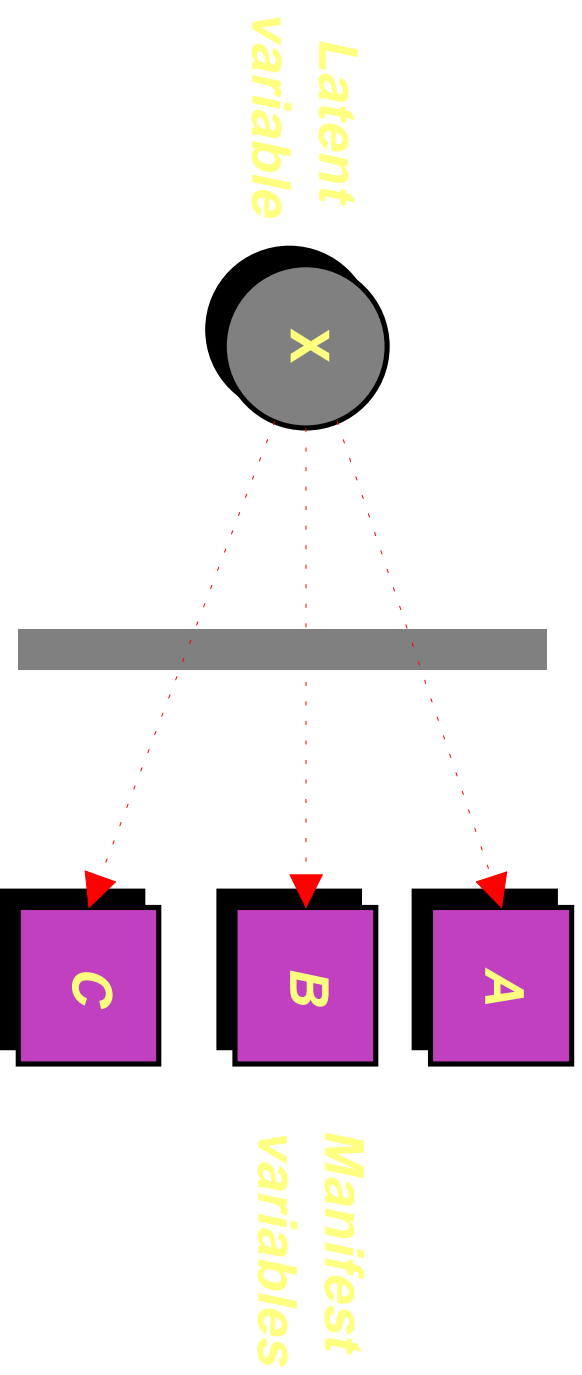
- the response is observable or manifest, but the response probability is unobservable or latent

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

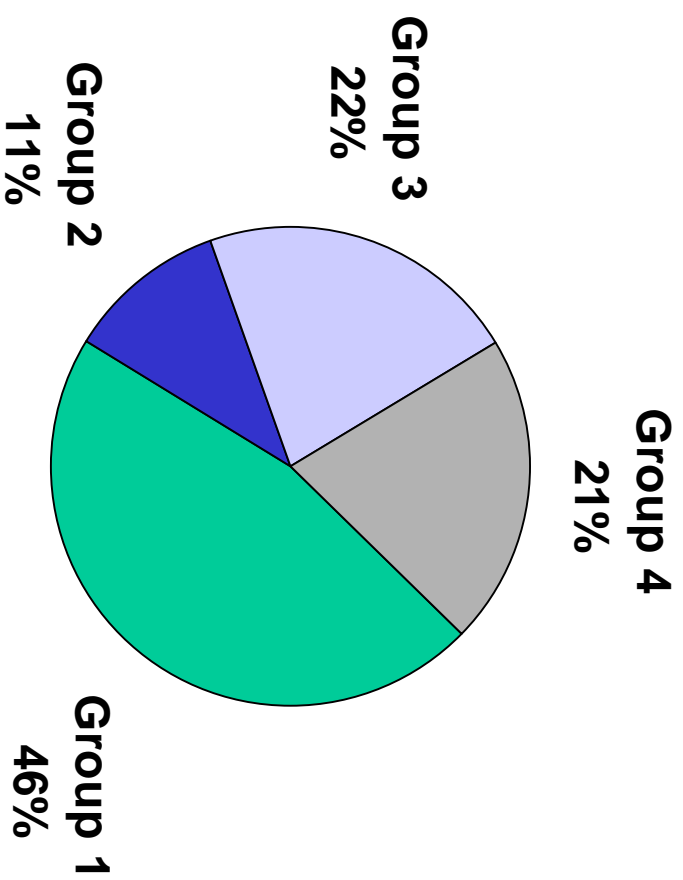
Patterns of collaboration

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

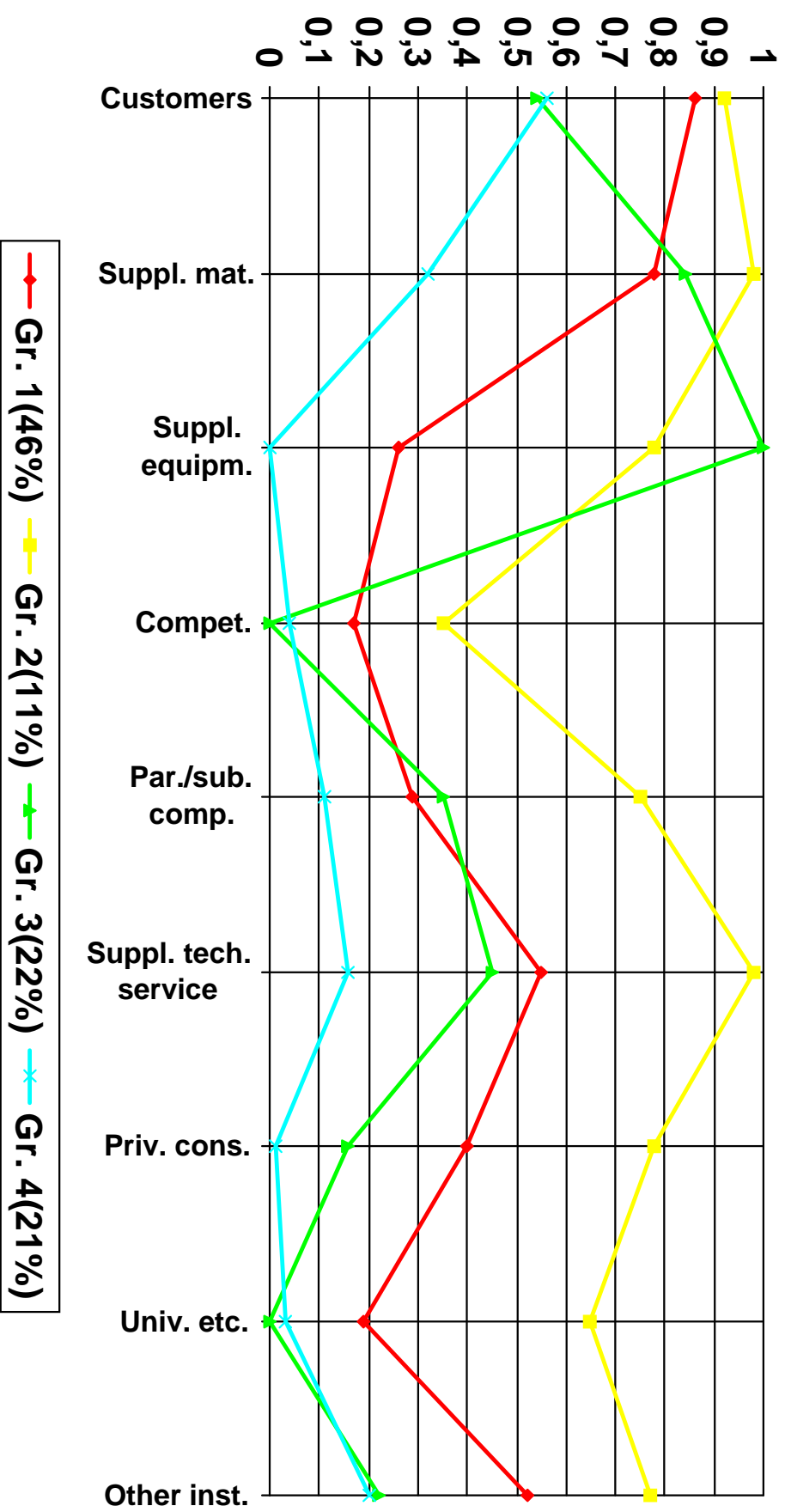
Patterns of collaboration

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.

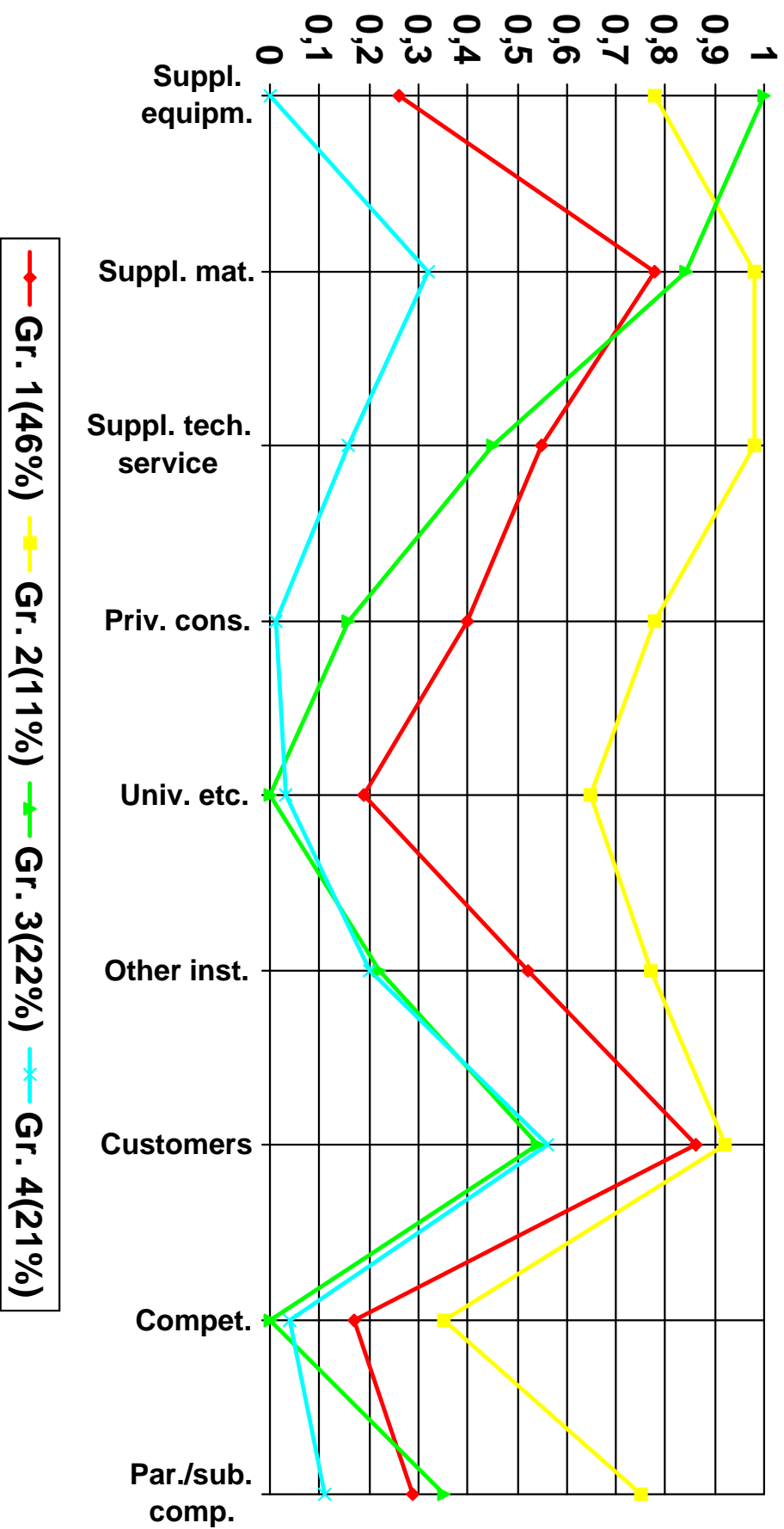
Patterns of collaboration

Results: Firm level

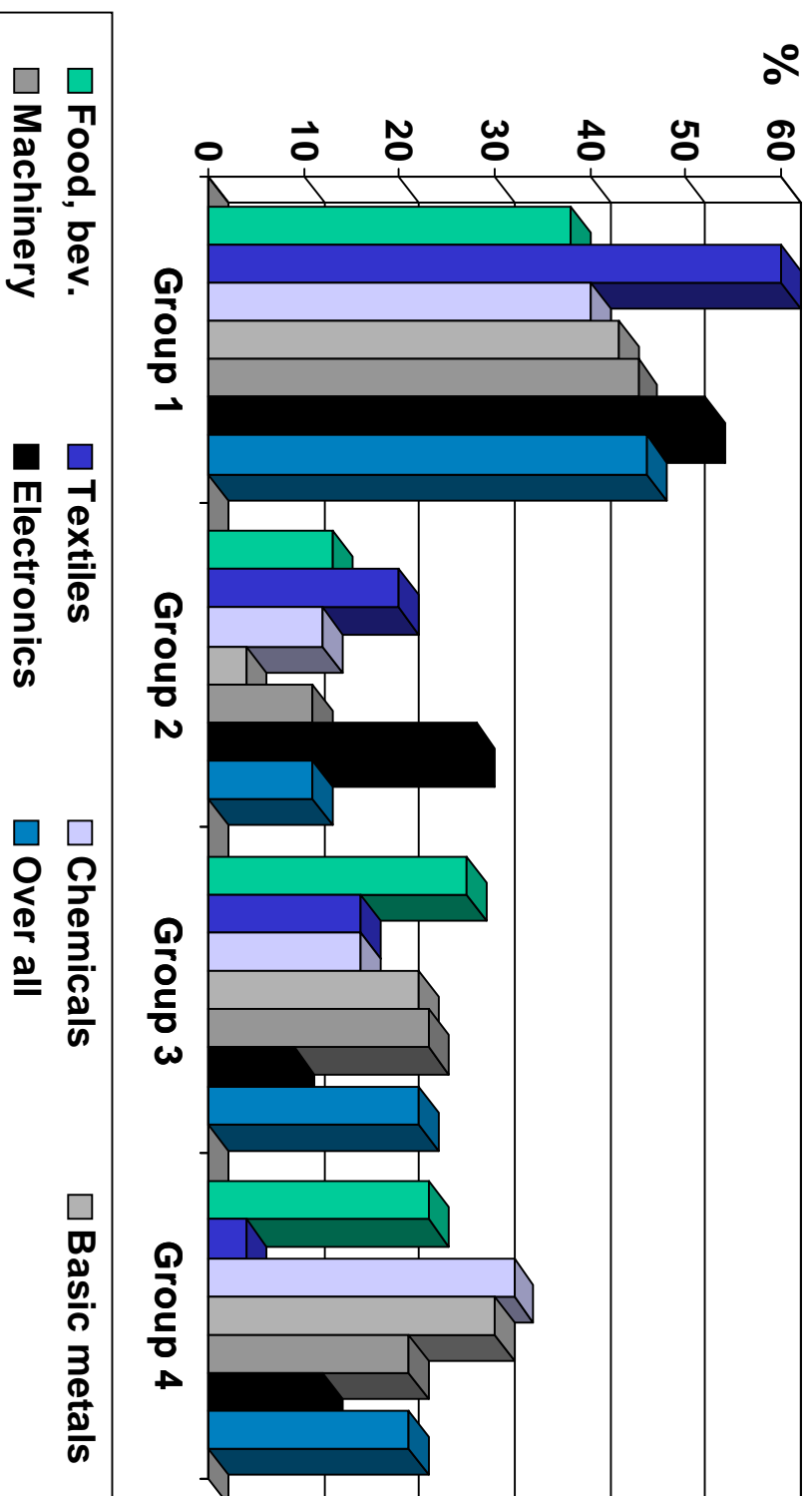
- On the next slide we have tried to sort (partially) the different types of collaborators according to their position in the value chain. A more clear picture appears.

Patterns of collaboration

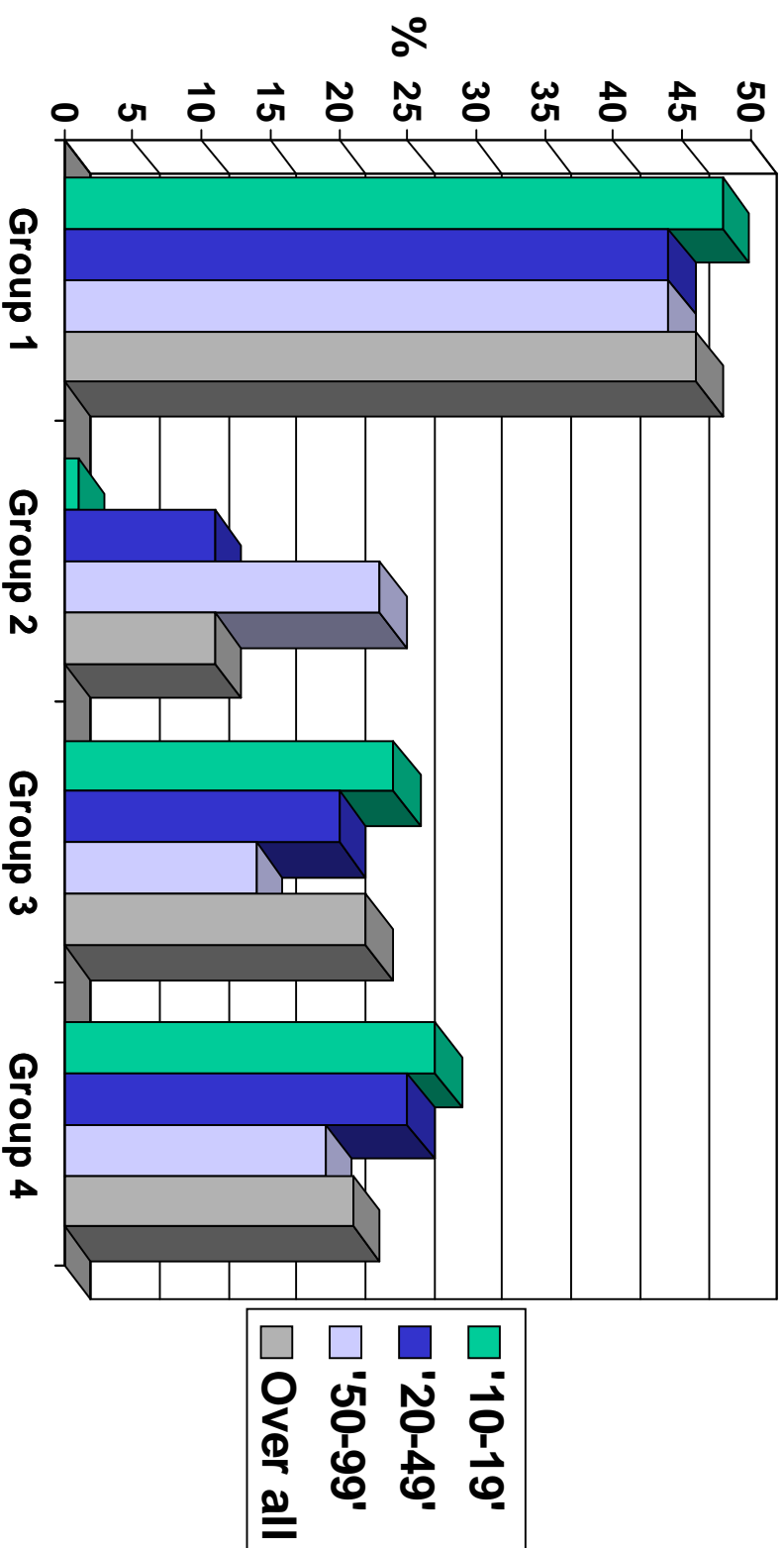
Results: Firm level



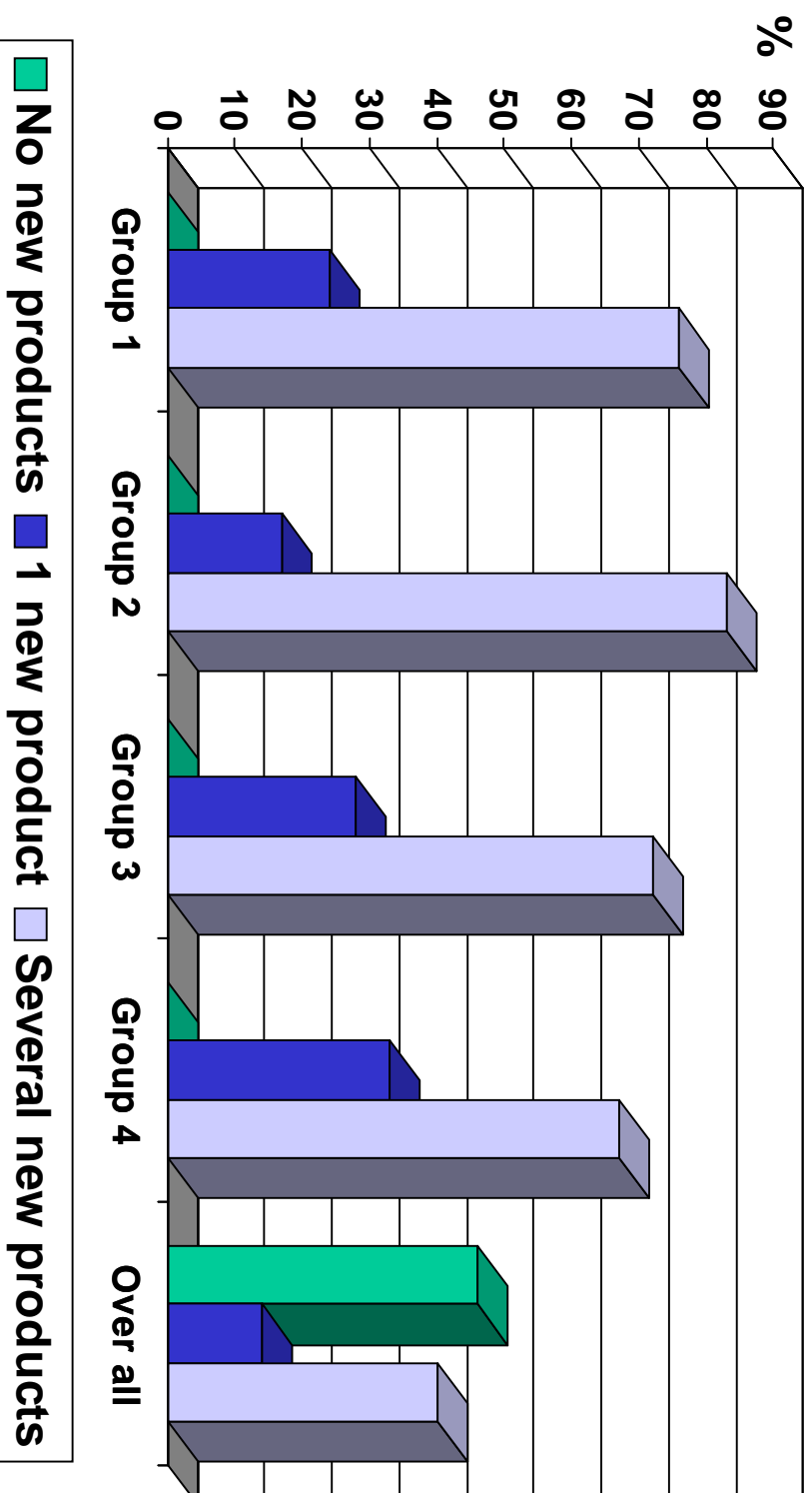
Relating the patterns to other parts of the questionnaire



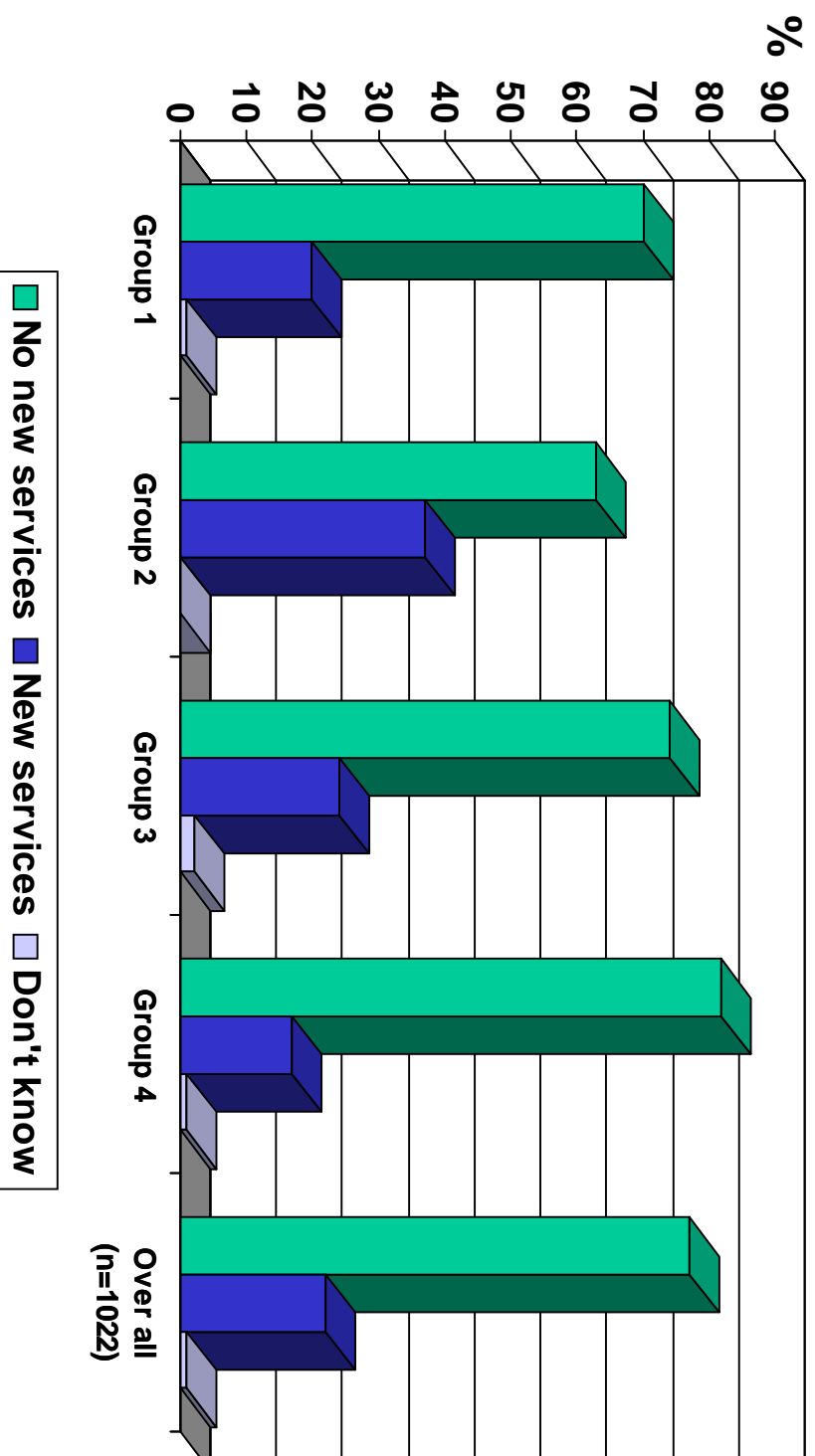
Relating the patterns to other parts of the questionnaire



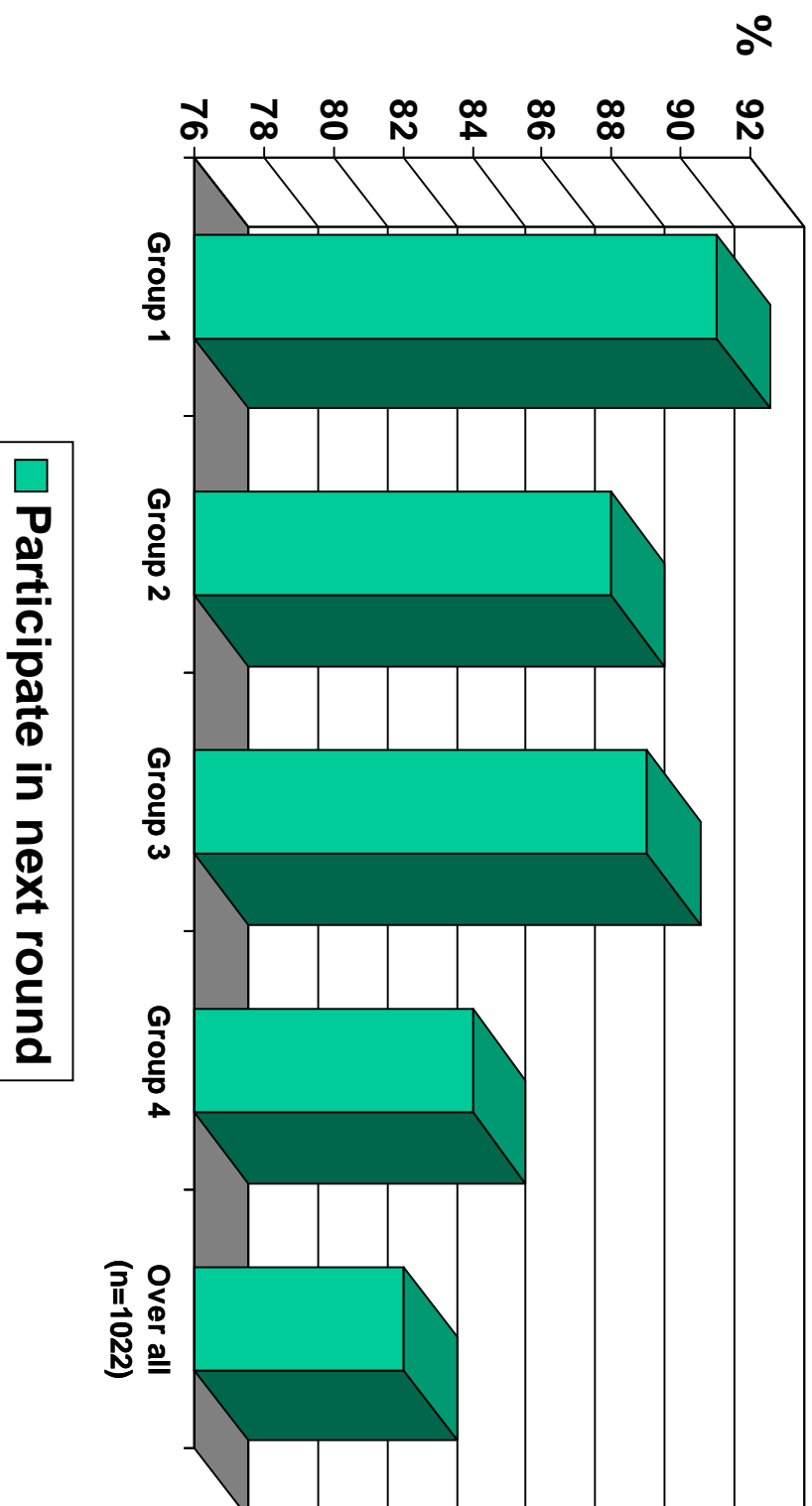
Relating the patterns to other parts of the questionnaire



Relating the patterns to other parts of the questionnaire

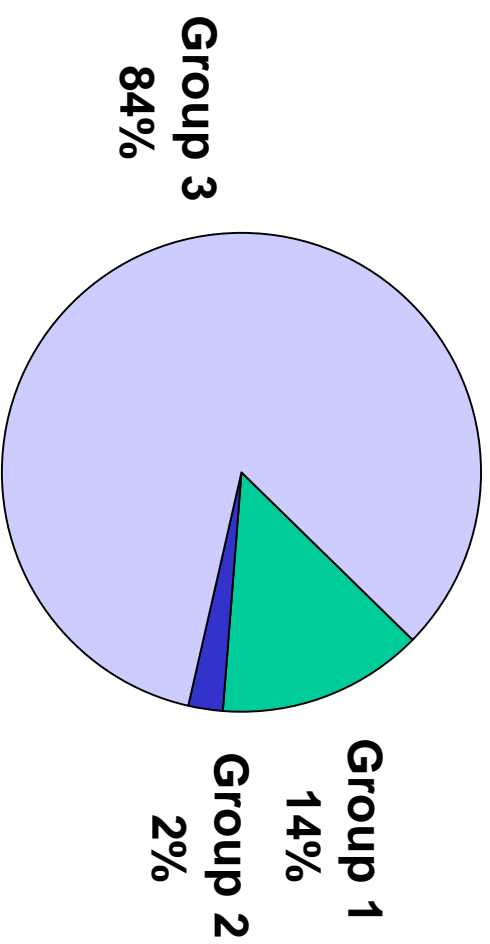


Relating the patterns to other parts of the questionnaire



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.