Student Experiences and Opinions on the Practical Application of Software Engineering Methods and Technologies in Industry: Case Studies in *SW Romania – Oltenia* and *Albania*

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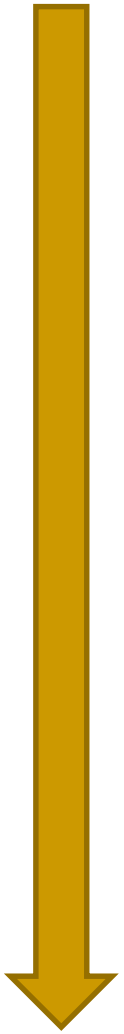
Outline

- Introduction and Motivation
- Target Audience
- Questionnaire Structure
- Results
- Discussion
- Conclusions



Aim & Method

- Aim: Better guidance of CS students in SE education based on real-life practical requirements by aligning academic education with practical requirements specific to real-life SE projects.
- Method: Collect and analyze data about the real experiences and opinions of students on the practical applicability of current software methodologies and technologies in IT industries.

Target Audience

- Romanian students group: ~450 students
  - 1st , 2nd, 3rd year CS bachelor students: ~350 students
  - 1st and 2nd year SE and ISB master students: ~100 students
  - Invitation email to participate was sent via Google Classroom

- Albanian students group: ~250 students

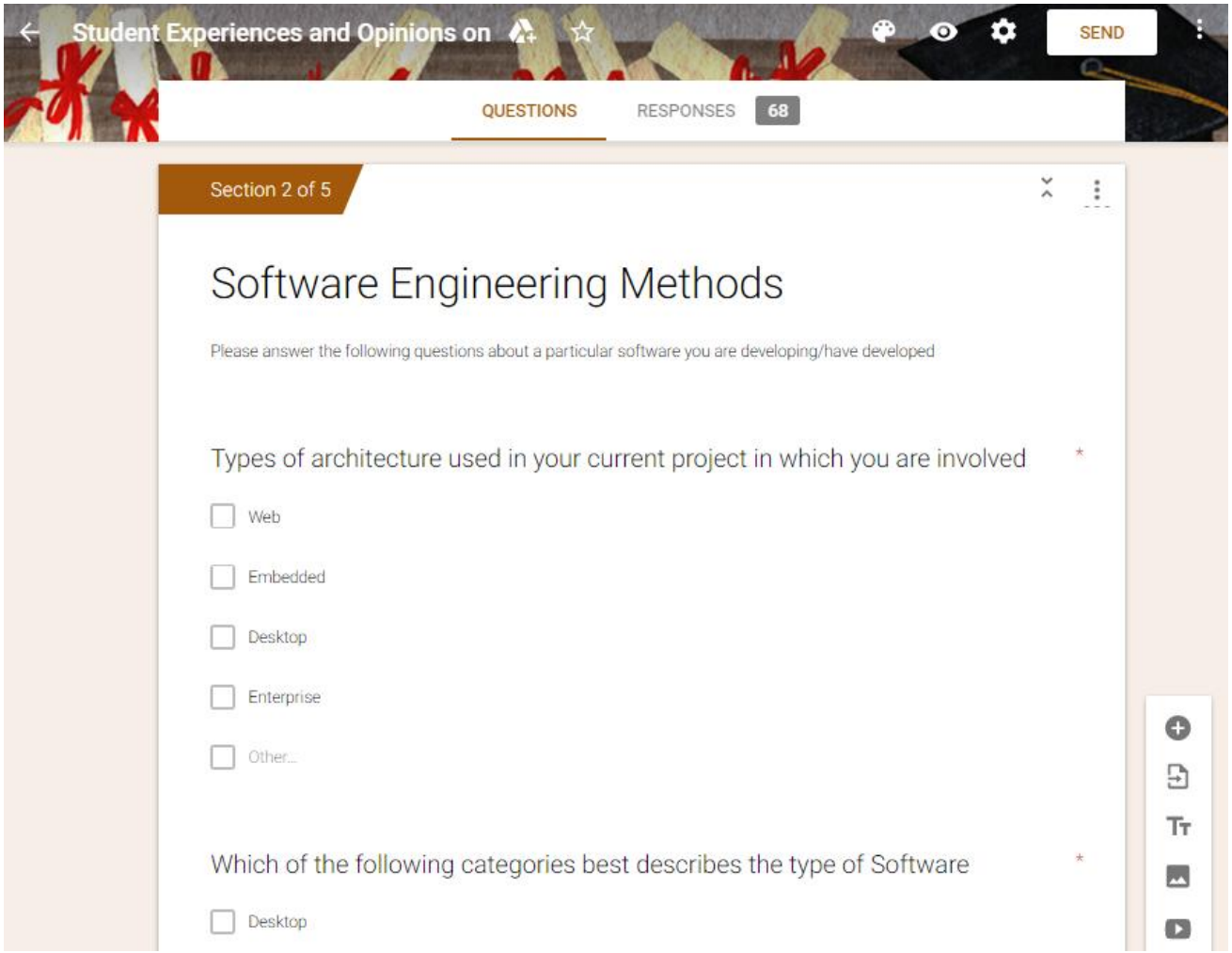
Questionnaire response

- 68 responses distributed:
  - Romania: 46
  - Albania: 22 (1 in Sofia)
- Age:
  - 67: 19 – 26
  - 1: 34
- Gender:
  - 33.8 % female
  - 66.2 % male
- Students: 89.6 %
- Graduates: 10.4%

Questionnaire Structure

- Preliminaries
  - 13 questions
- Software Engineering Methods
  - 5 questions
- Software Methodologies
  - 17 questions
- School and Career
  - 8 questions
- Total: 43 (initial questionnaire had 20 questions)

Questionnaire Implementation



Questionnaire – Preliminaries

- Company name
- Job title
- Company location
- No. of employees
- Company objective
- Age
- Level of education
- Future education plans
- Gender
- Student or graduated?
- Years of employment
- Work experience
- Project fulltime staff

Questionnaire - Methods

- Types of architecture
- Software type / category
- Project application domain
- Duration of involvement in the project
- Team Work ?

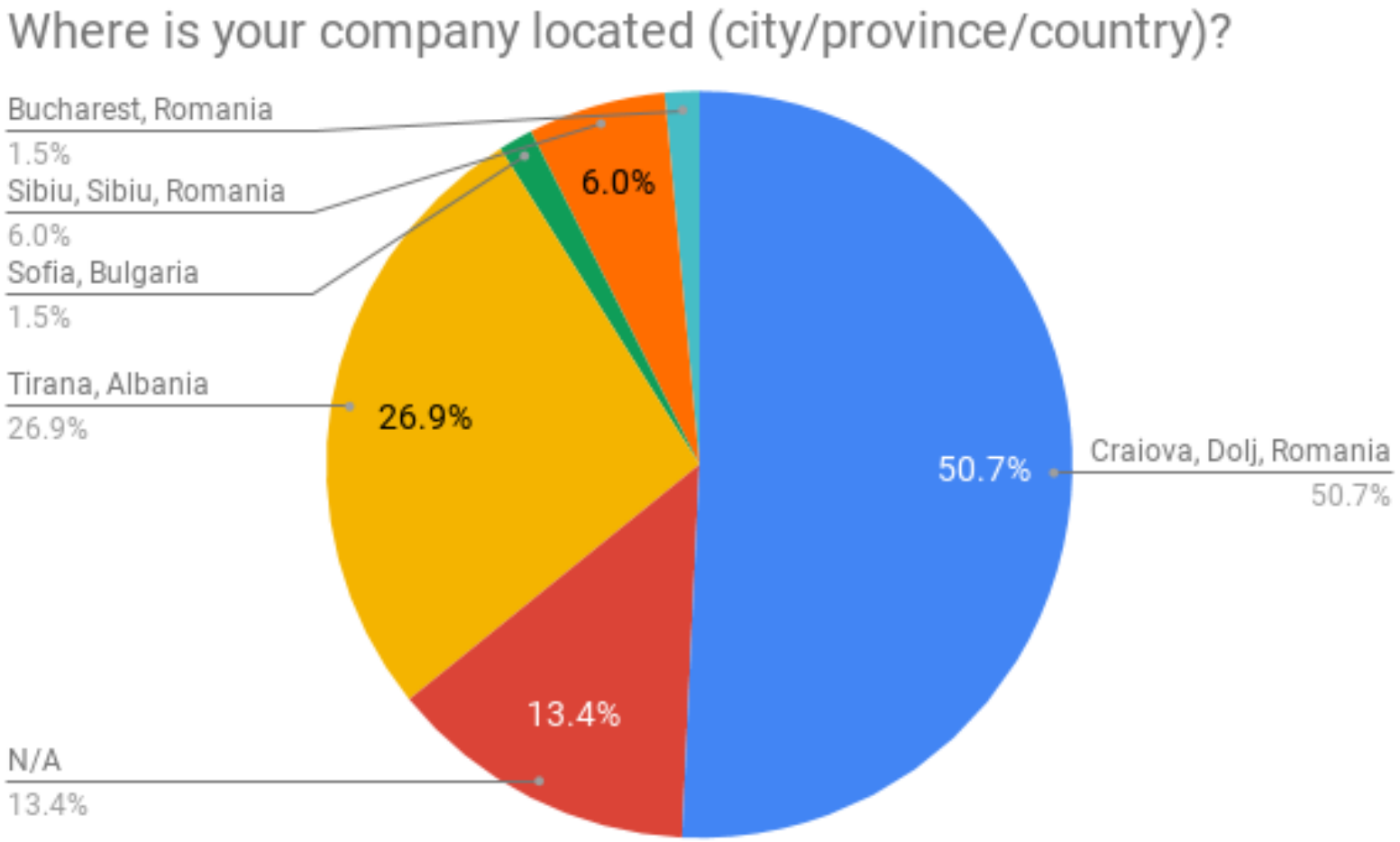
Questionnaire - Methodologies

- Size of project as lines of code
- Software Quality Management approaches
- Development life-cycle management
- Analysis and design approaches
- Modeling notation
- Tools to complete your work
- Period of new version release
- Automated testing / Continuous Integration / Continuous Delivery
- Notation of requirements specification
- Software Quality and Software Productivity
- Appropriate management of software quality
- Your position in the project
- Testing methods
- Maintenance
- Your roles
- Multiple simultaneous roles

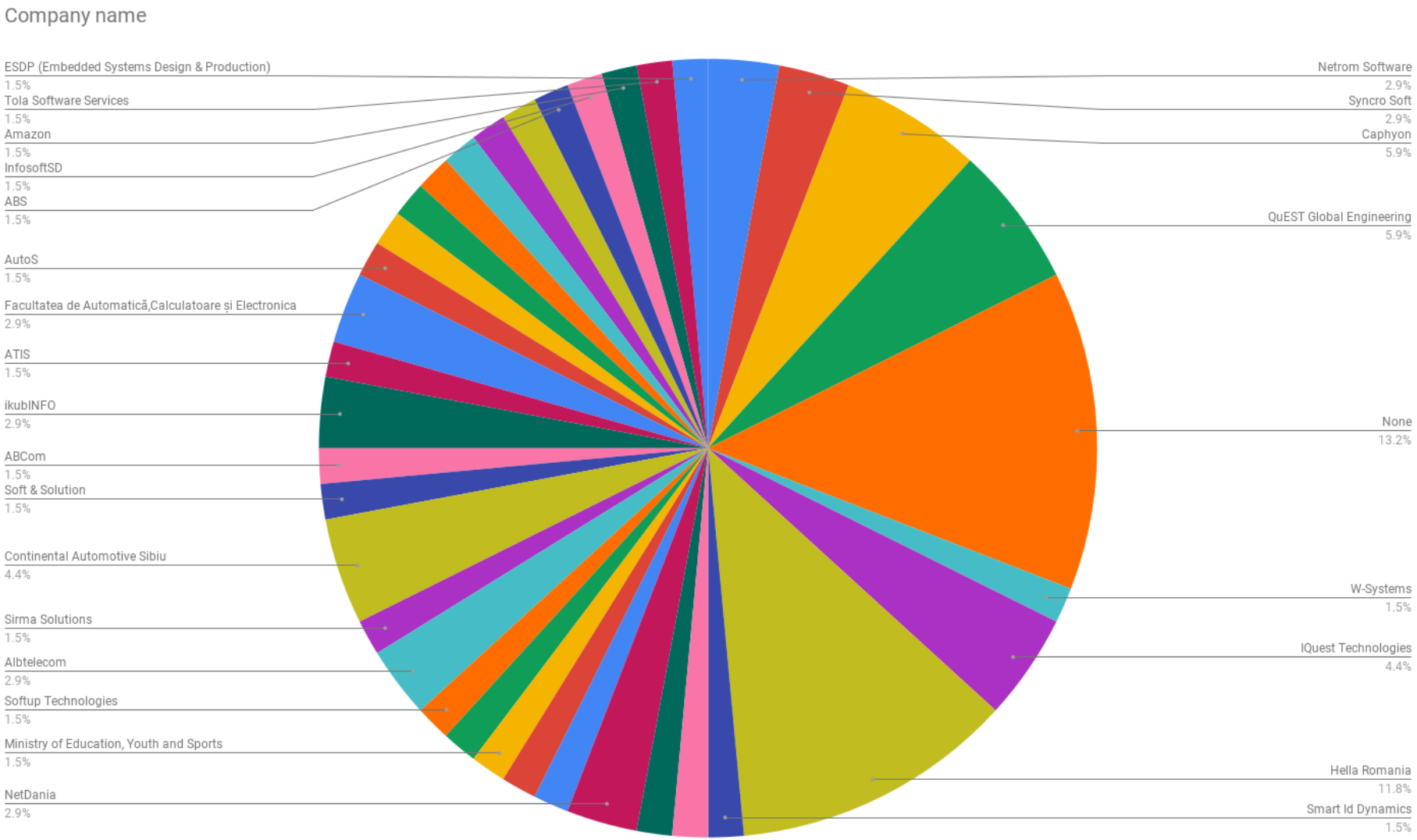
Overview – School and Career

- Project help to better understand academic subjects.
- Academic project help to better develop practical projects.
- Involvement by company in training courses?
- Learning focus when hired.
- Competencies needed in your company.
- Skills learned during practical projects that need better approach in school.
- Skills that would have been helpful being learned in the school.
- Expectance of more career guidance at school.

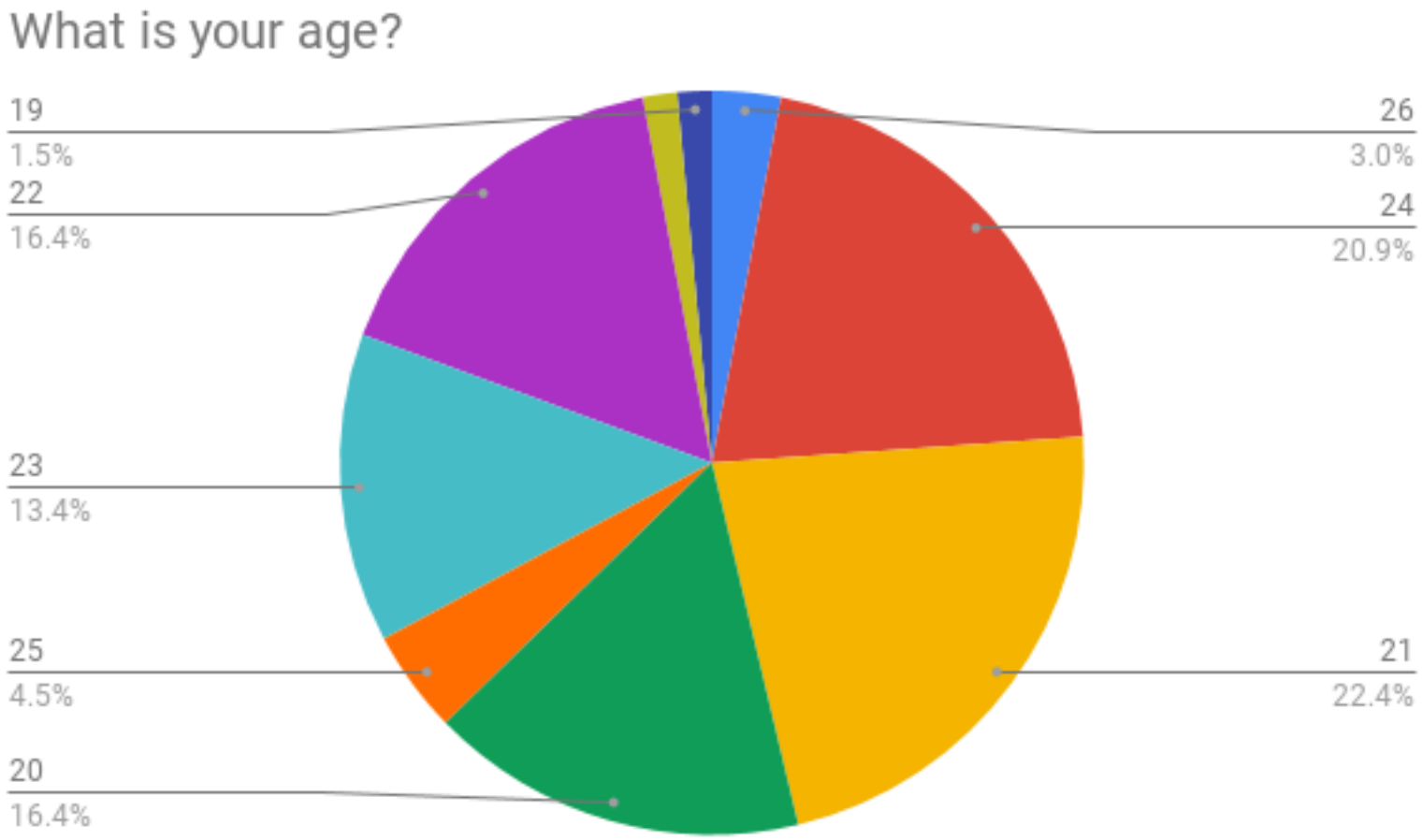
Company location



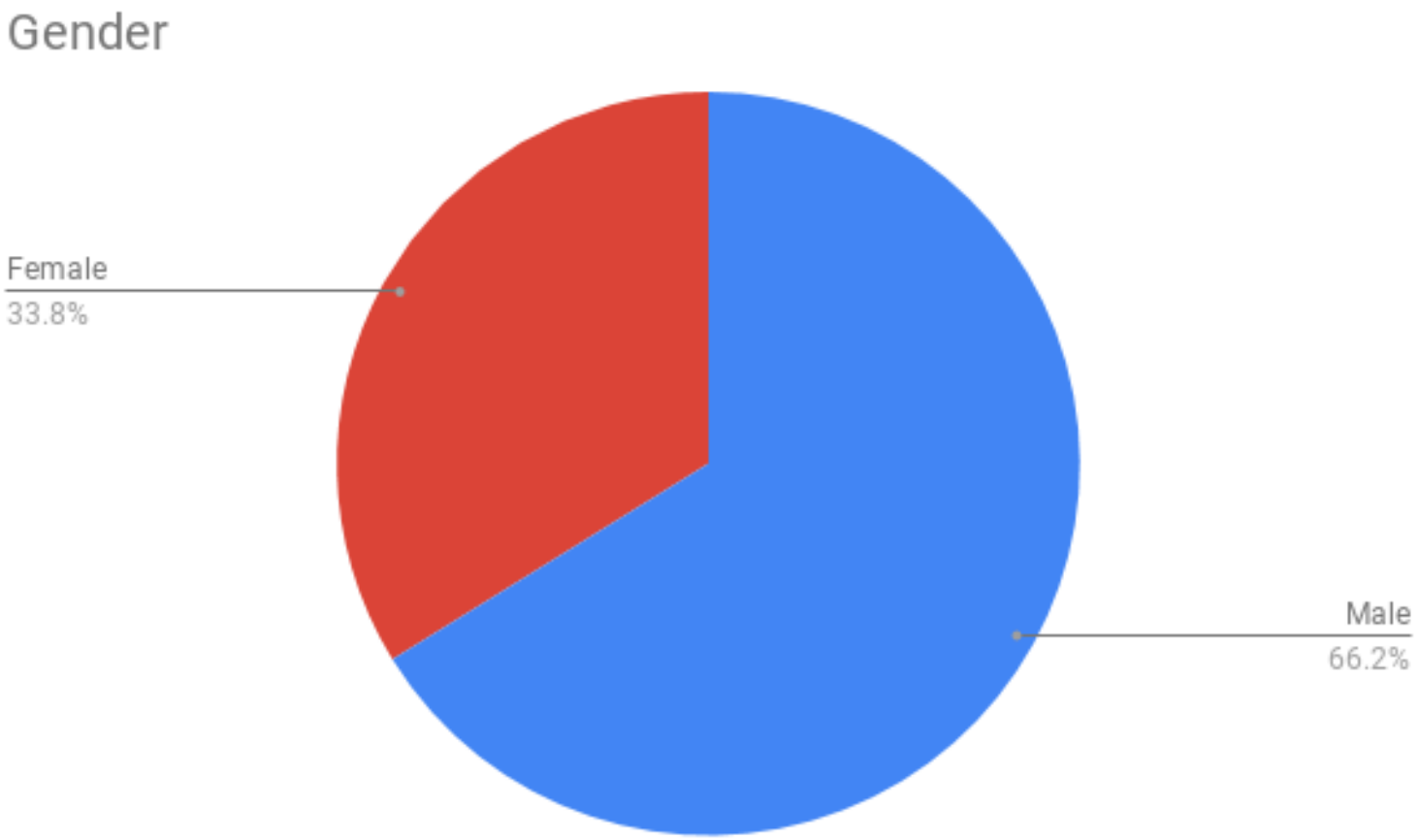
Company name



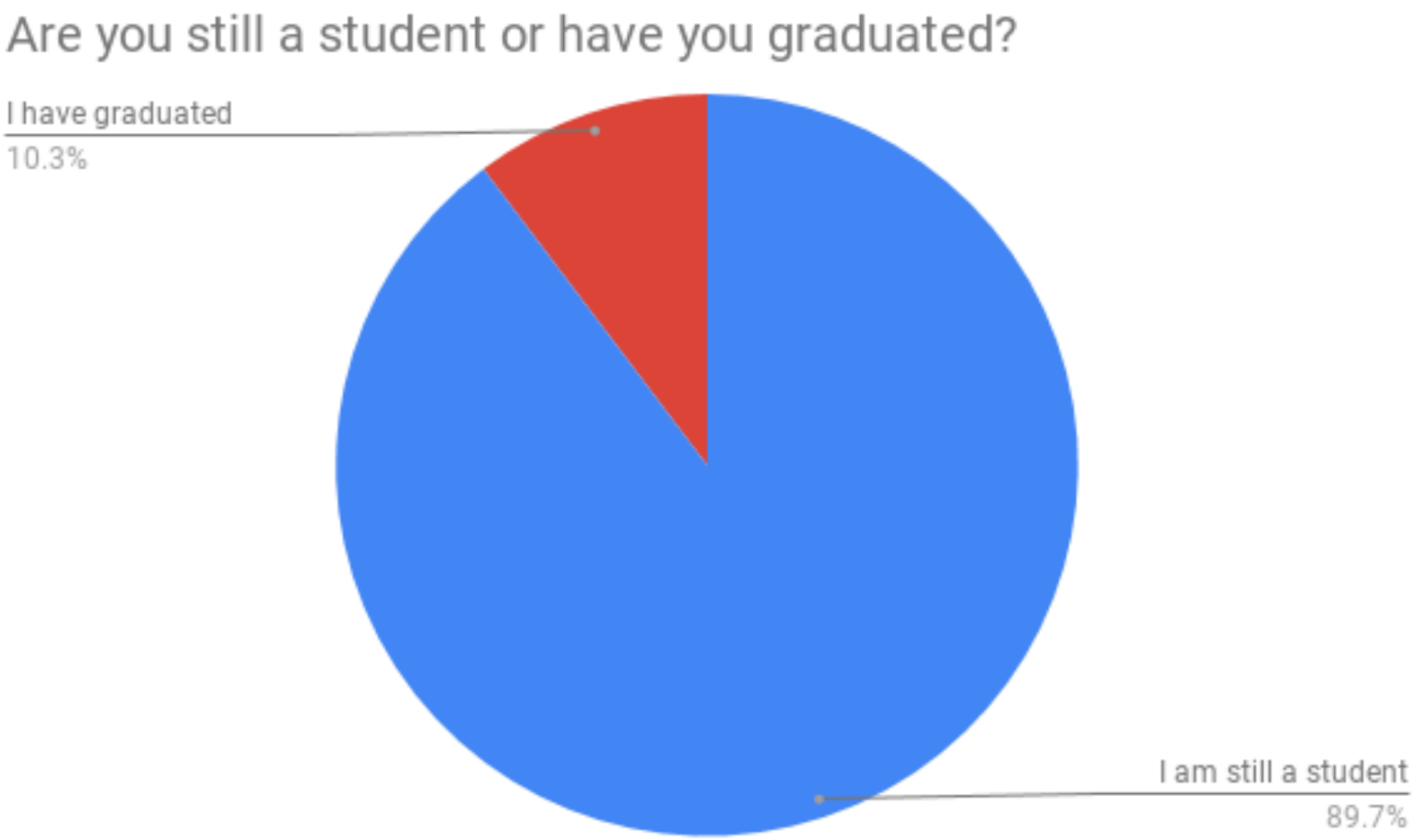
Age


What is your age?
19
1.5%
22
16.4%
23
13.4%
25
4.5%
20
16.4%
26
3.0%
24
20.9%
21
22.4%

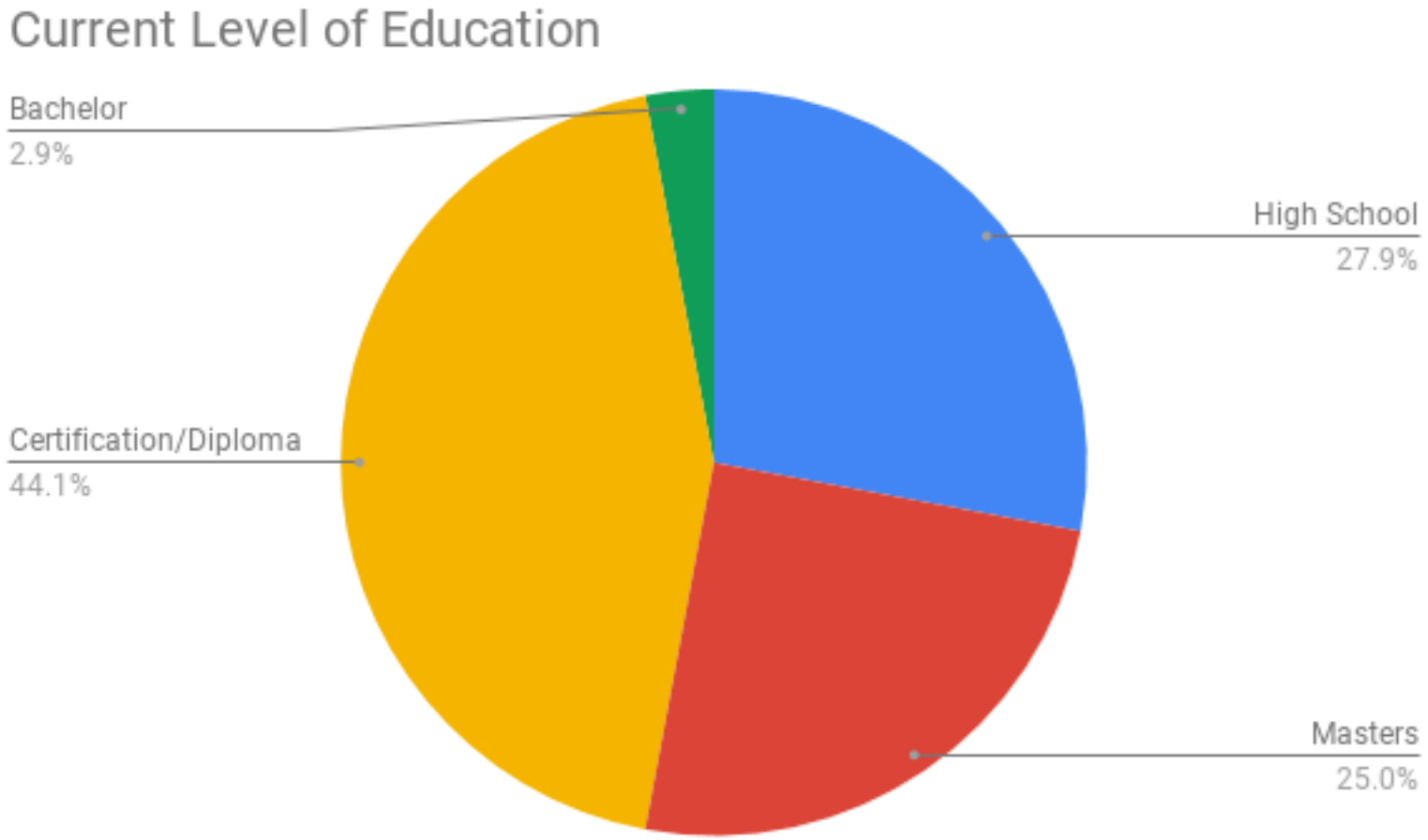
Gender



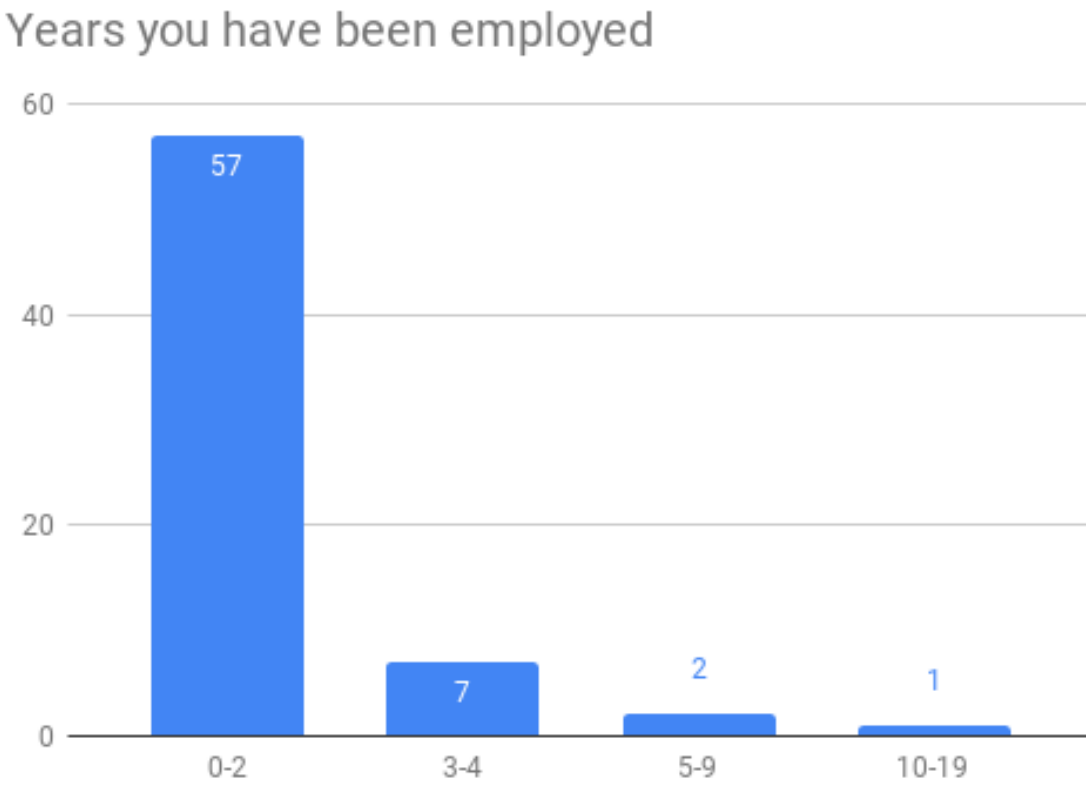
Still a student?



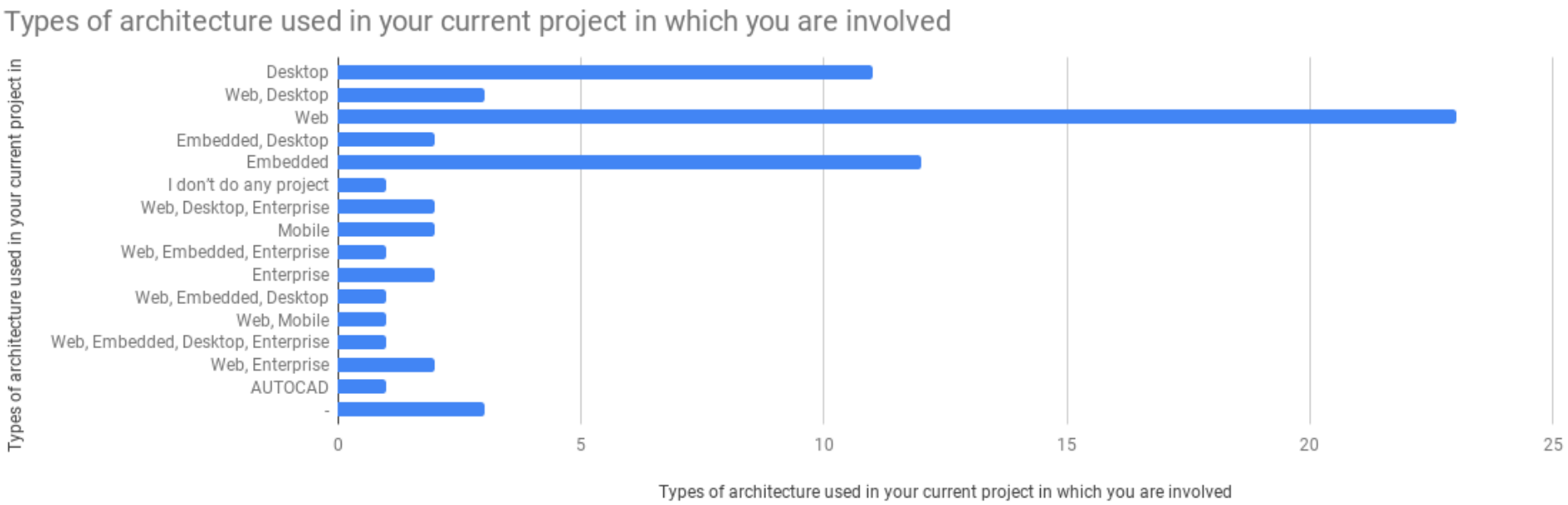
Level of education



Years of employment

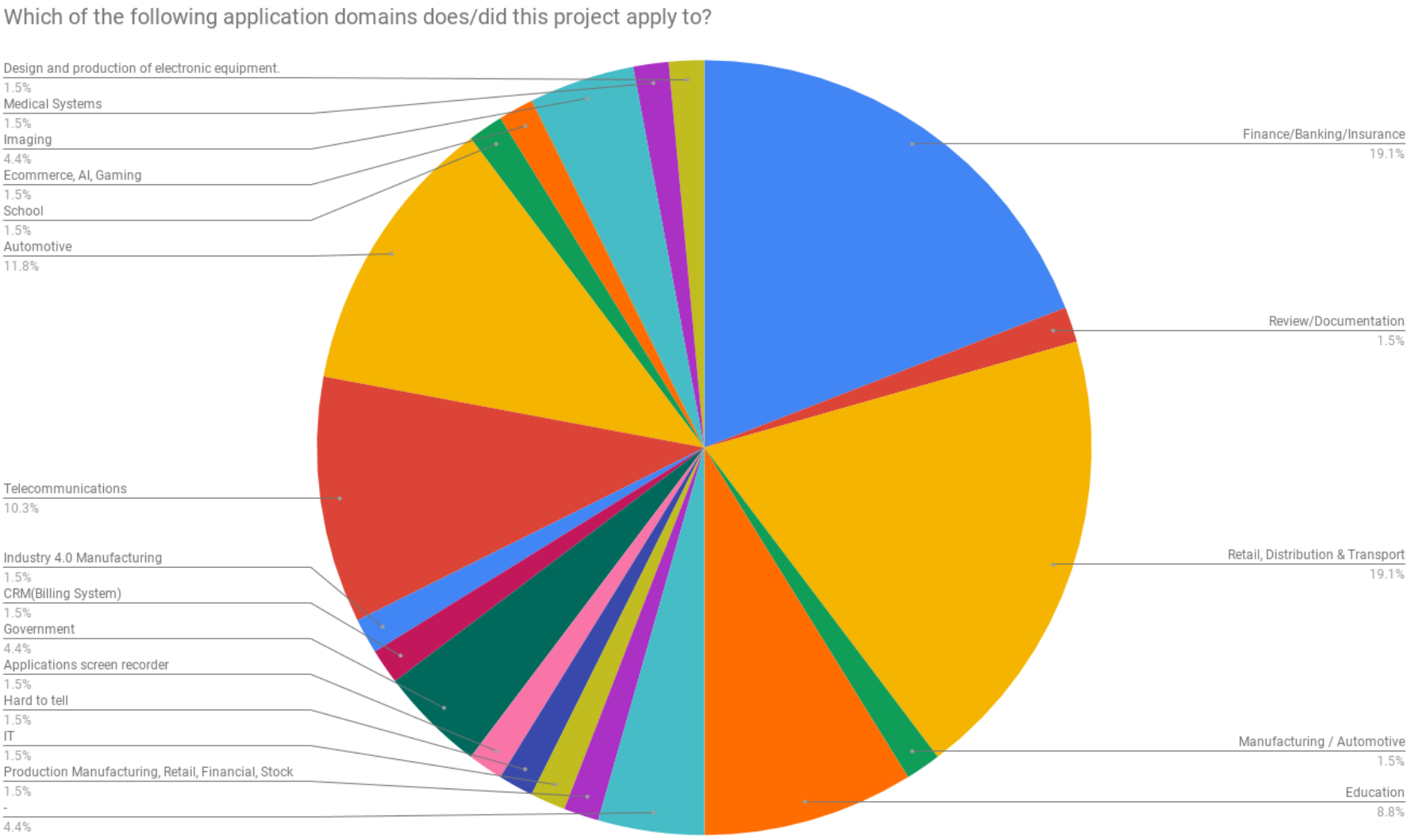


Type of architecture

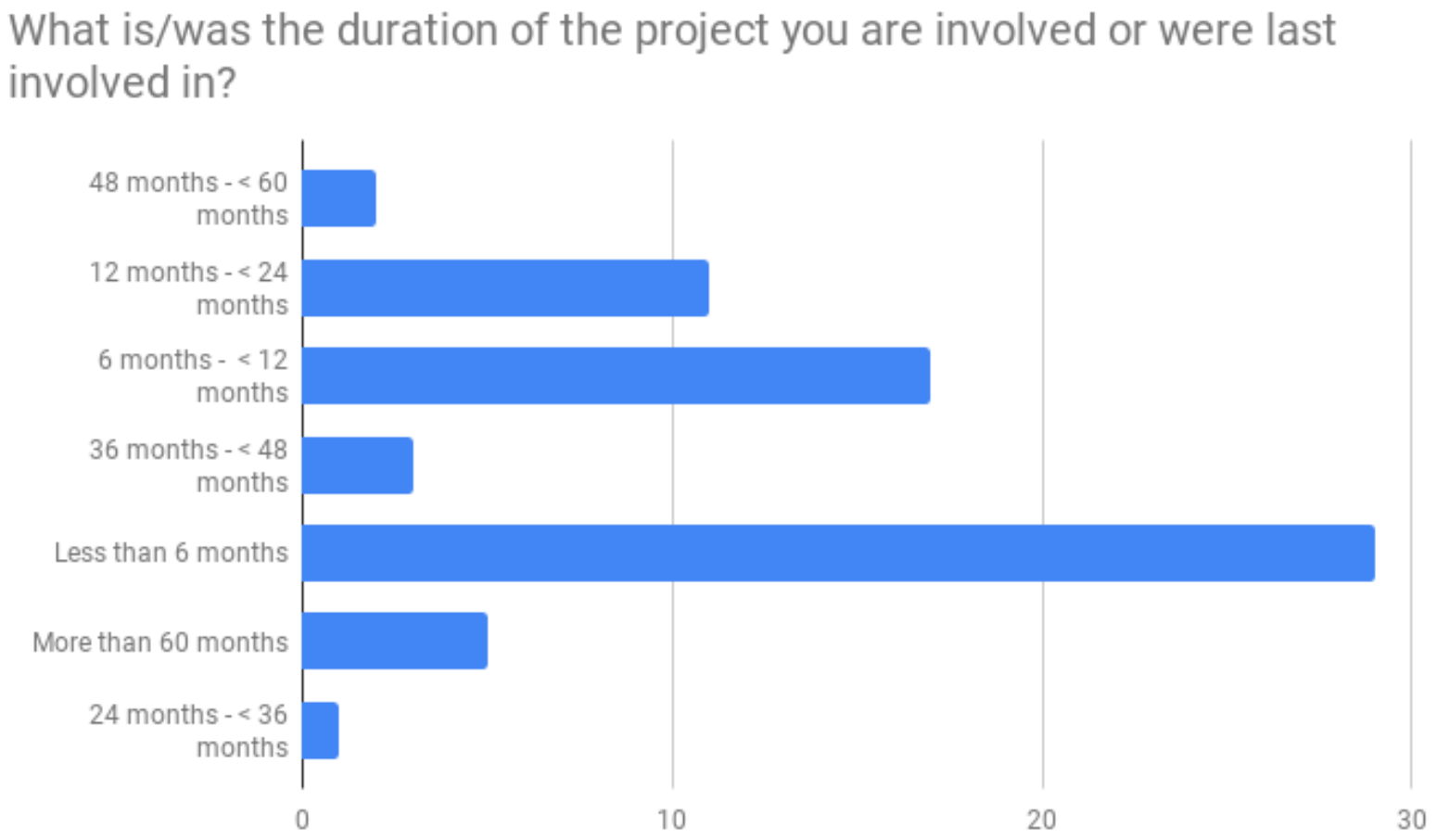


Web, Embedded, Desktop, Enterprise, Other

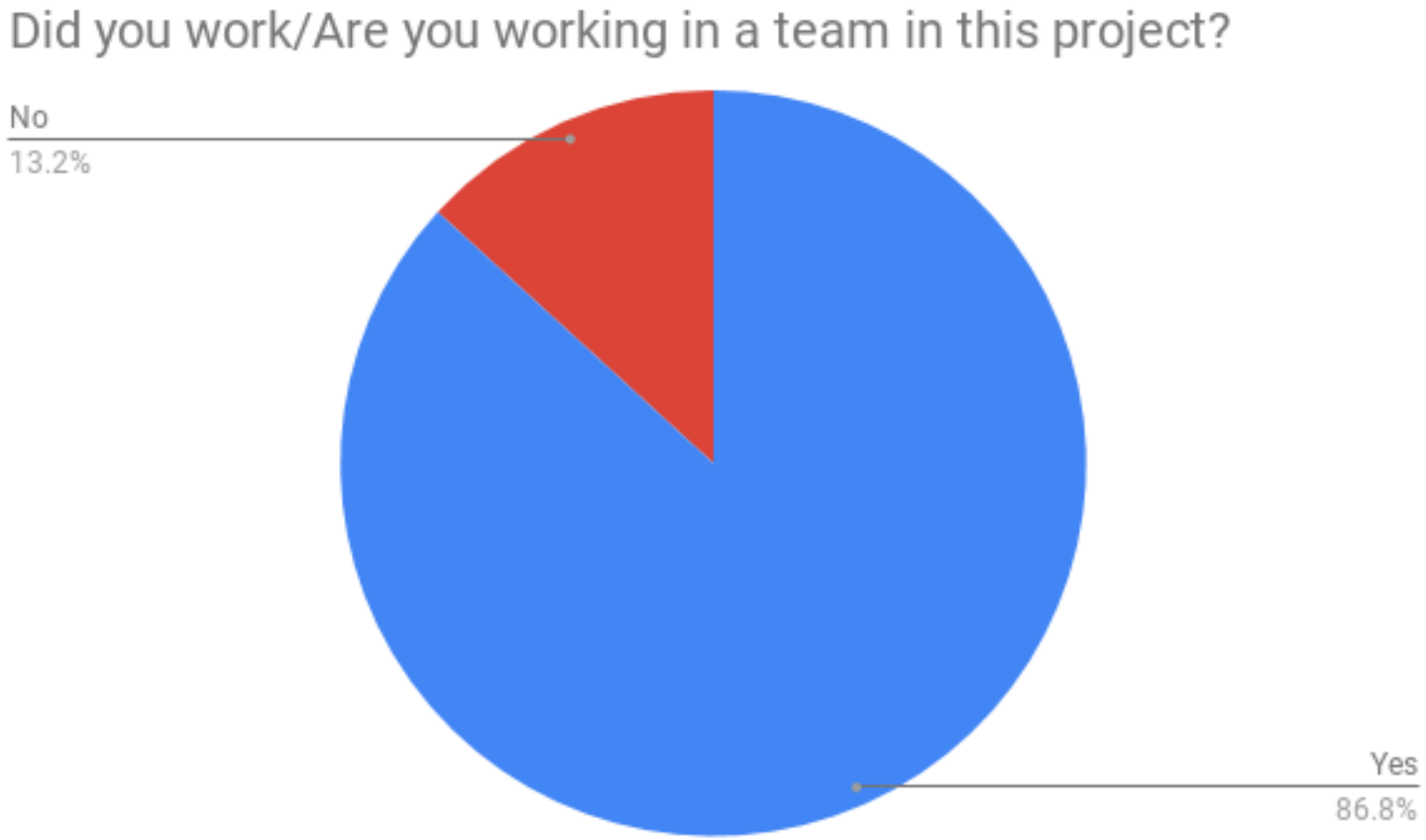
Application domain



Project duration

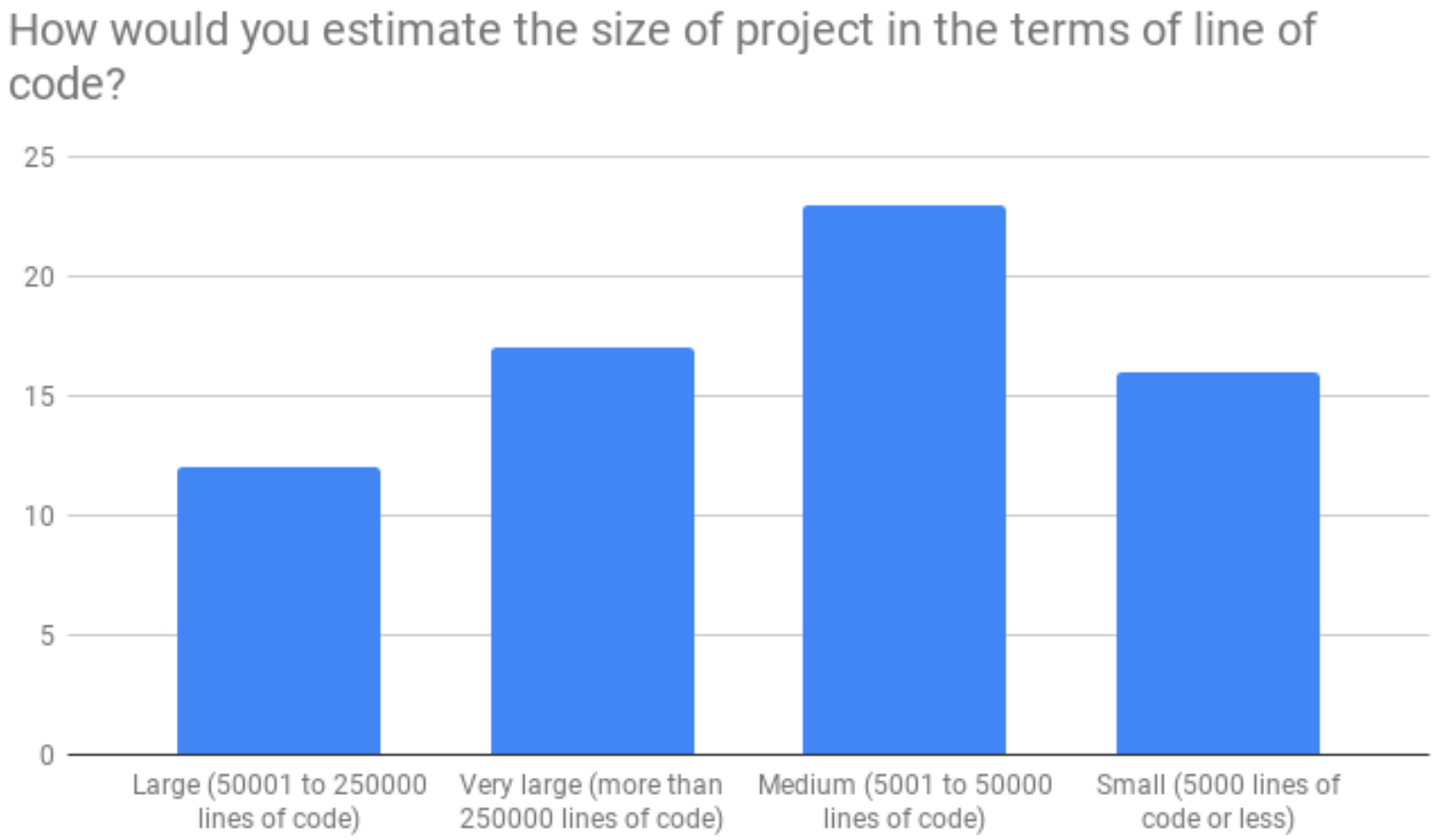


Team work

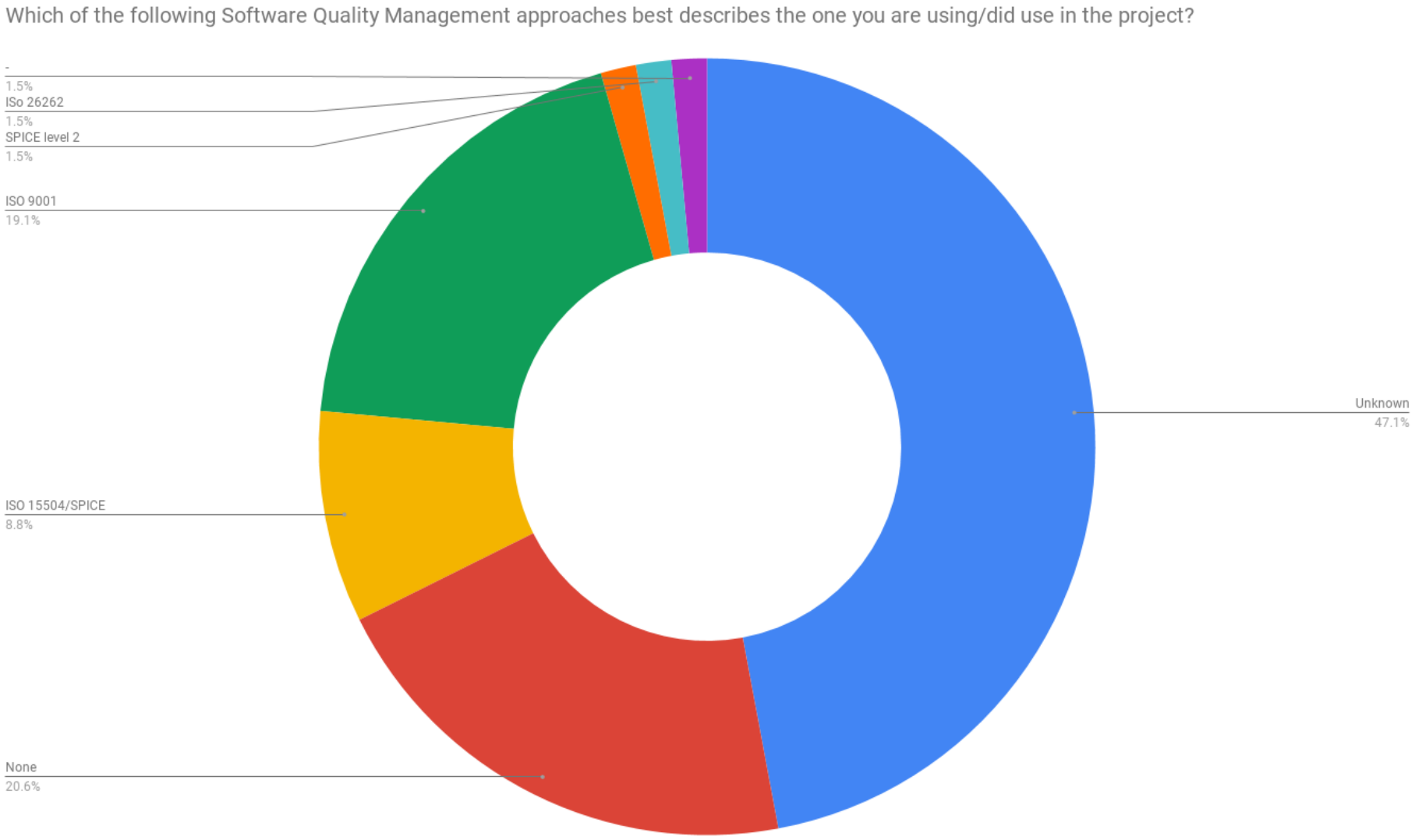

Did you work/Are you working in a team in this project?
No
13.2%
Yes
86.8%

Staff involved

Project size

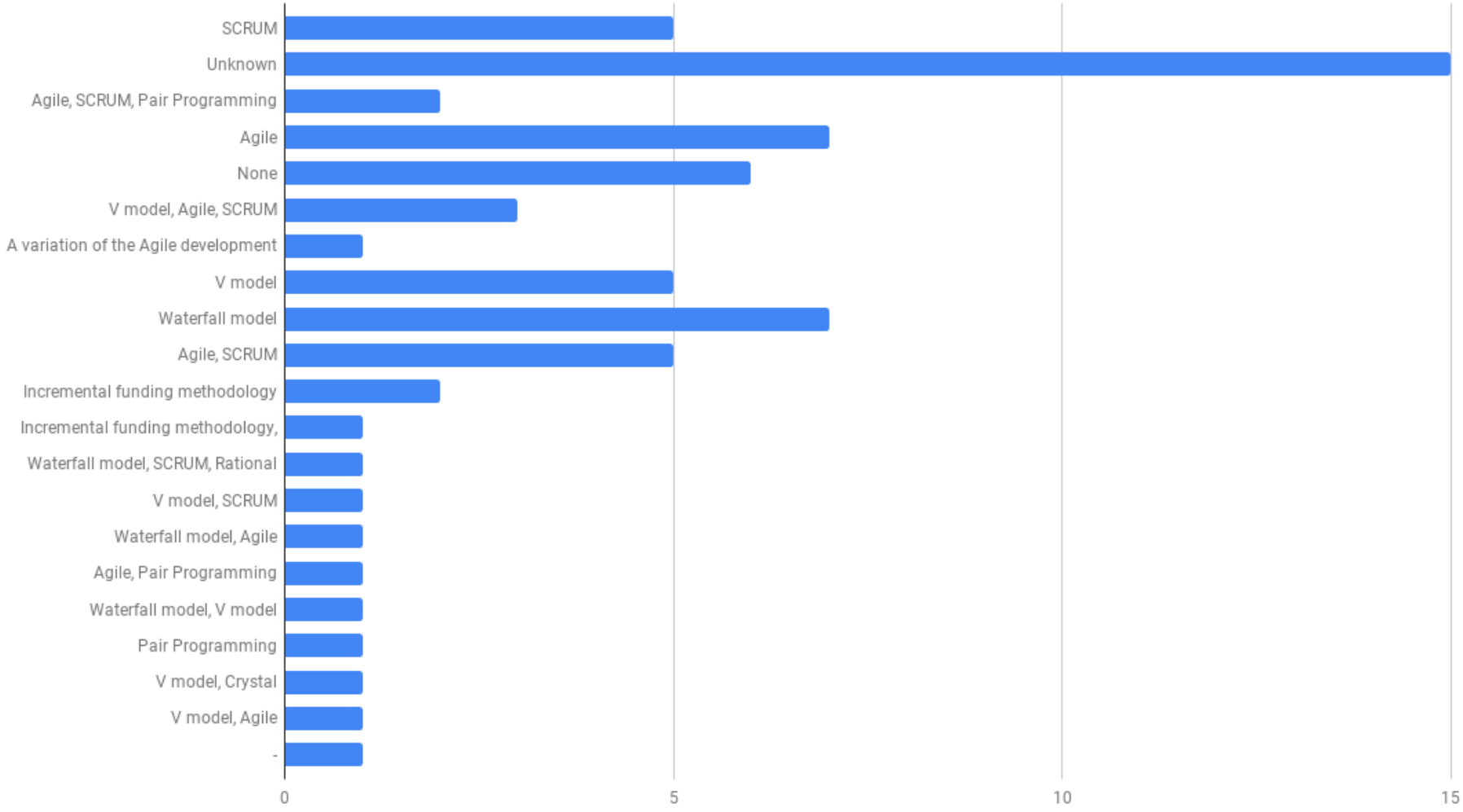


Software quality model

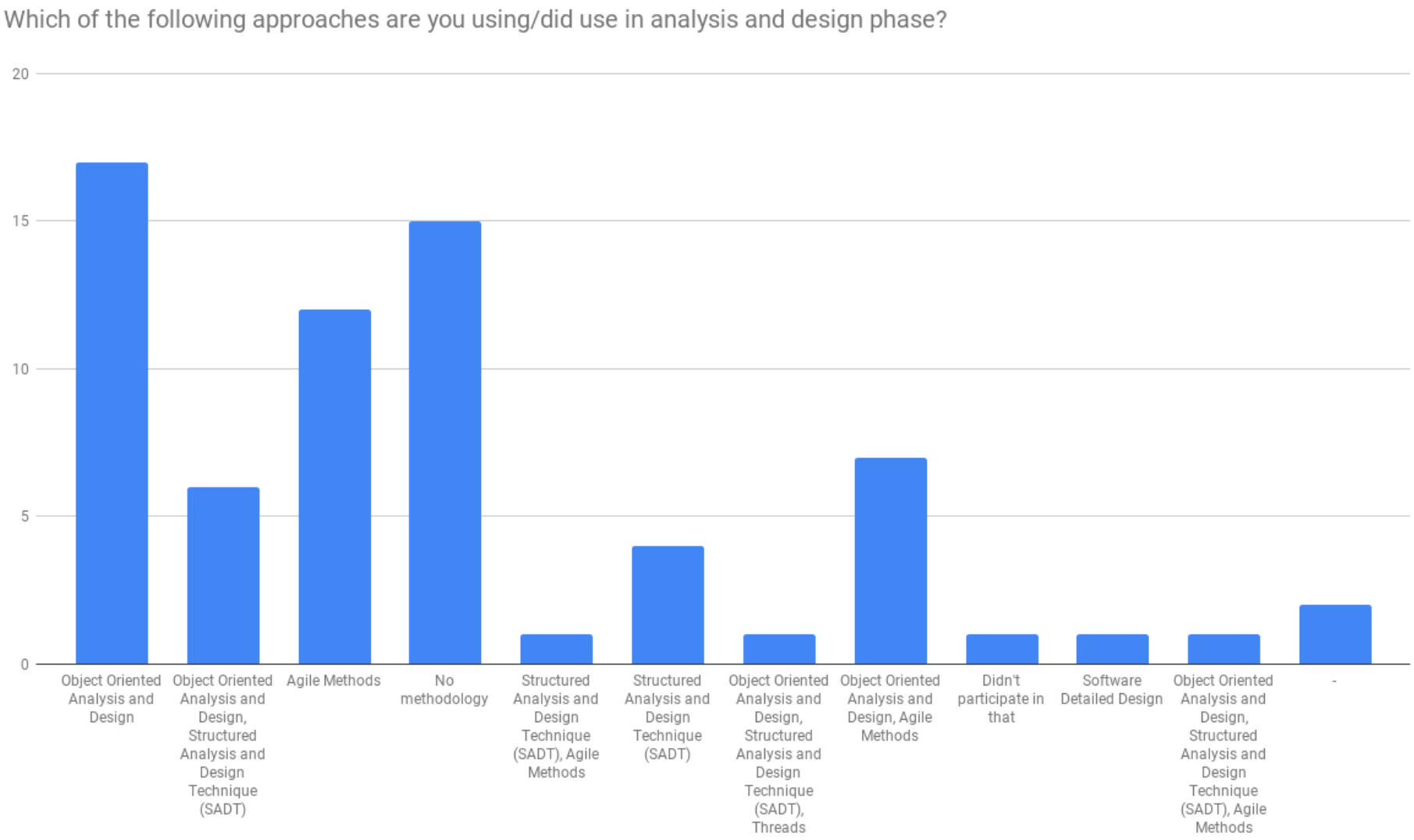


Development lifecycle

Which of the following development life-cycles best describes the one you are using/did use in your project?

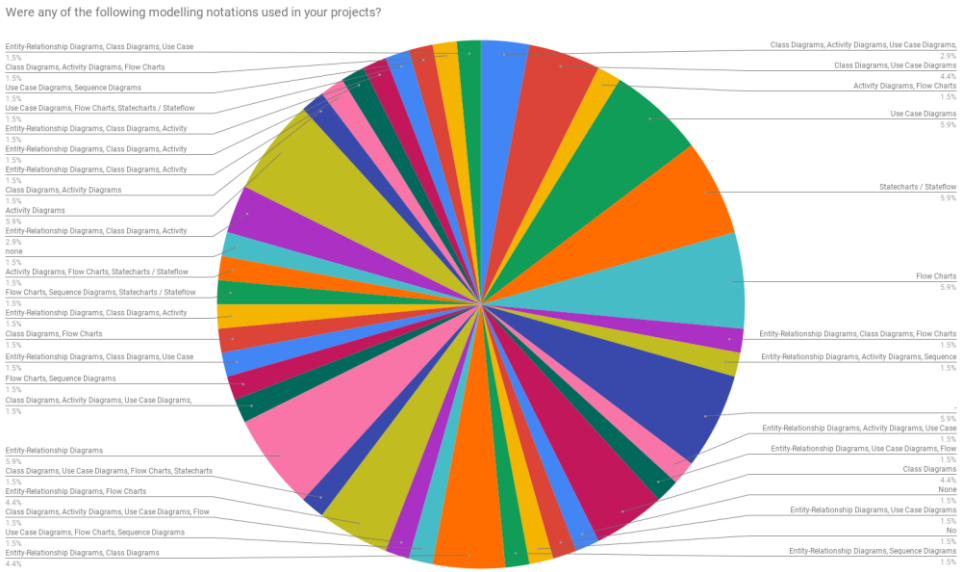


Analysis and design approaches



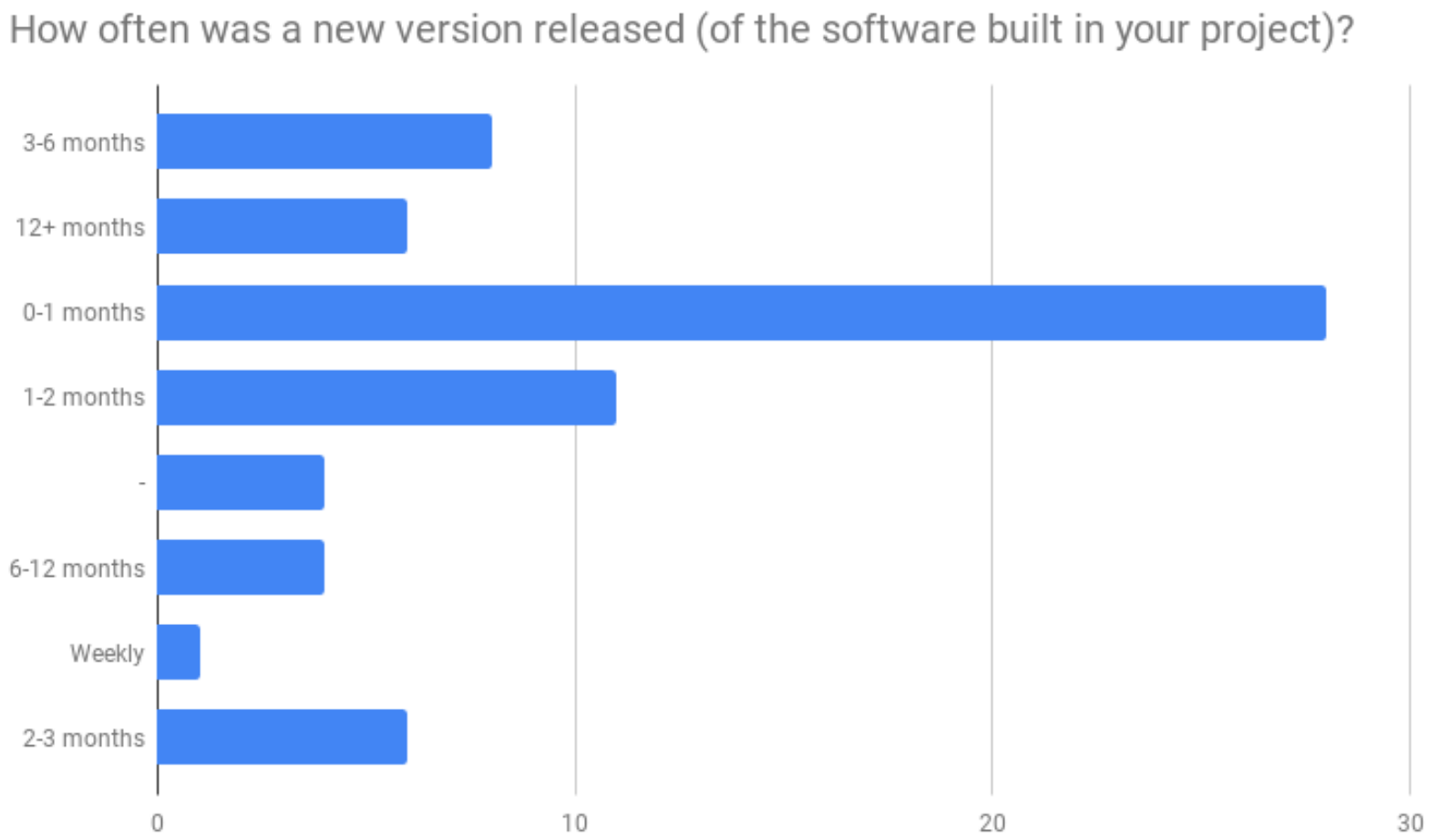
Modeling notations

- Were any of the following modeling notations used in your projects?
  - Entity-Relationship Diagrams
  - Class Diagrams
  - Activity Diagrams
  - Use Case Diagrams
  - Flow Charts
  - Sequence Diagrams
  - Statecharts / Stateflow
  - Other…

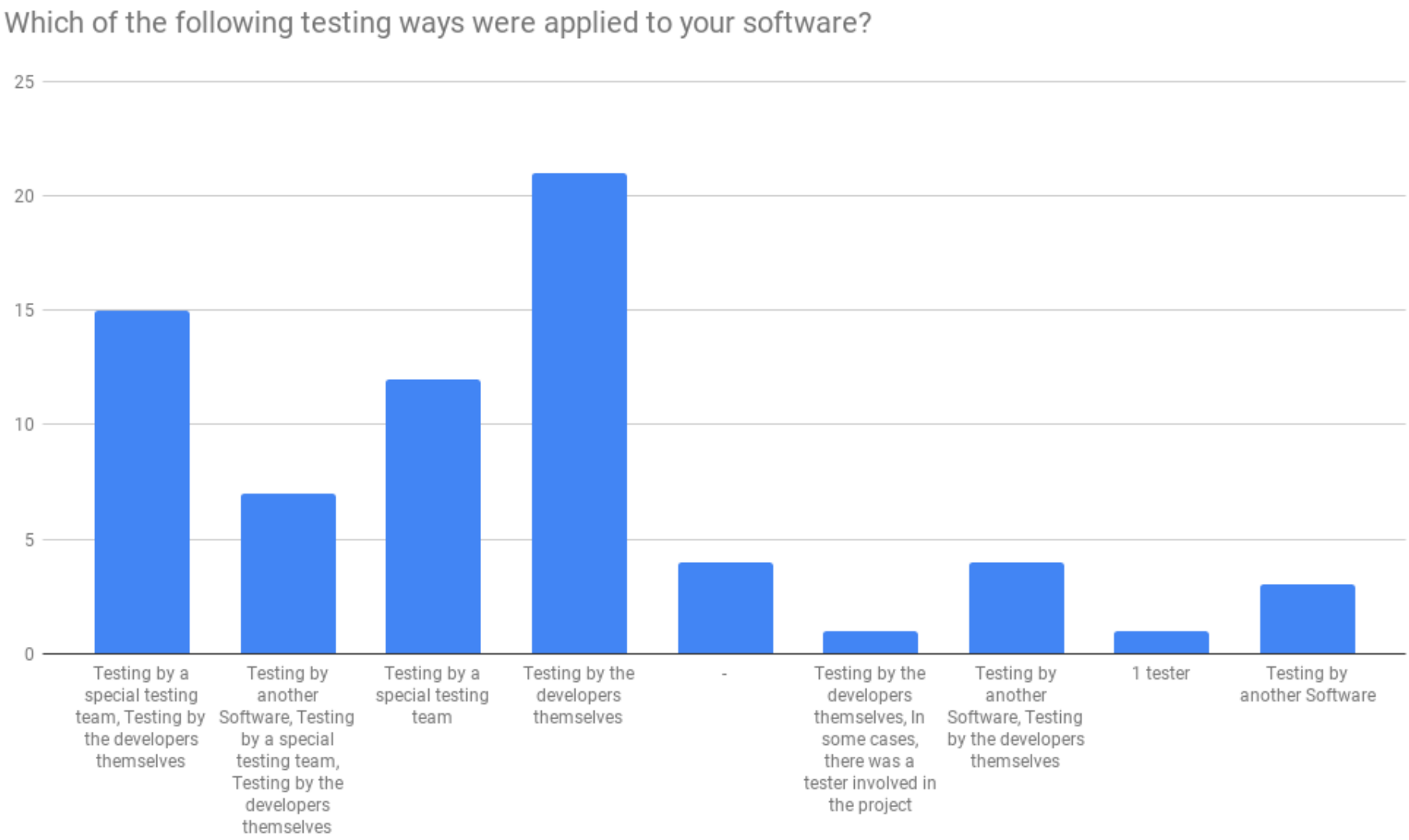


- **Resulted pie chart is too fragmented**

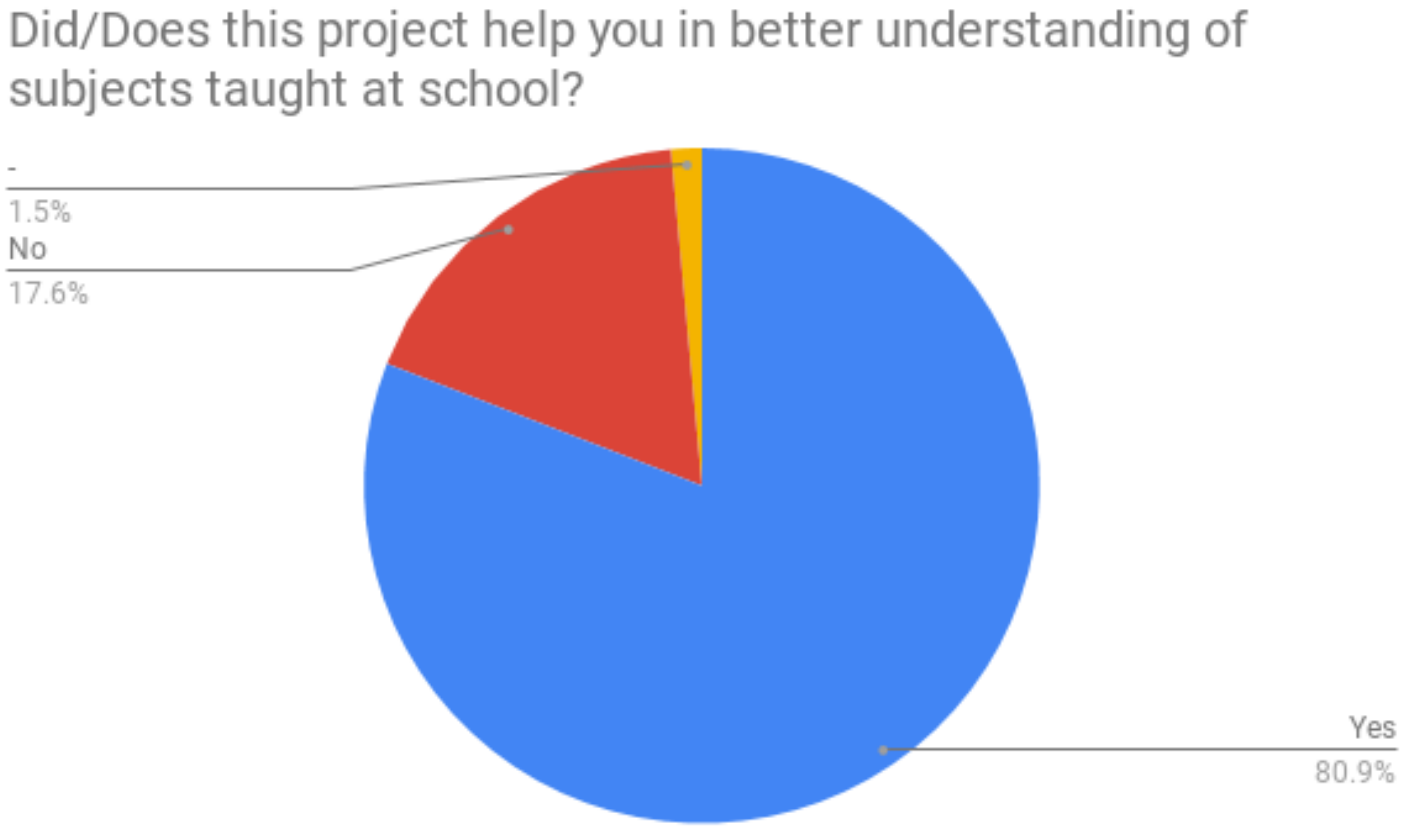
Release period



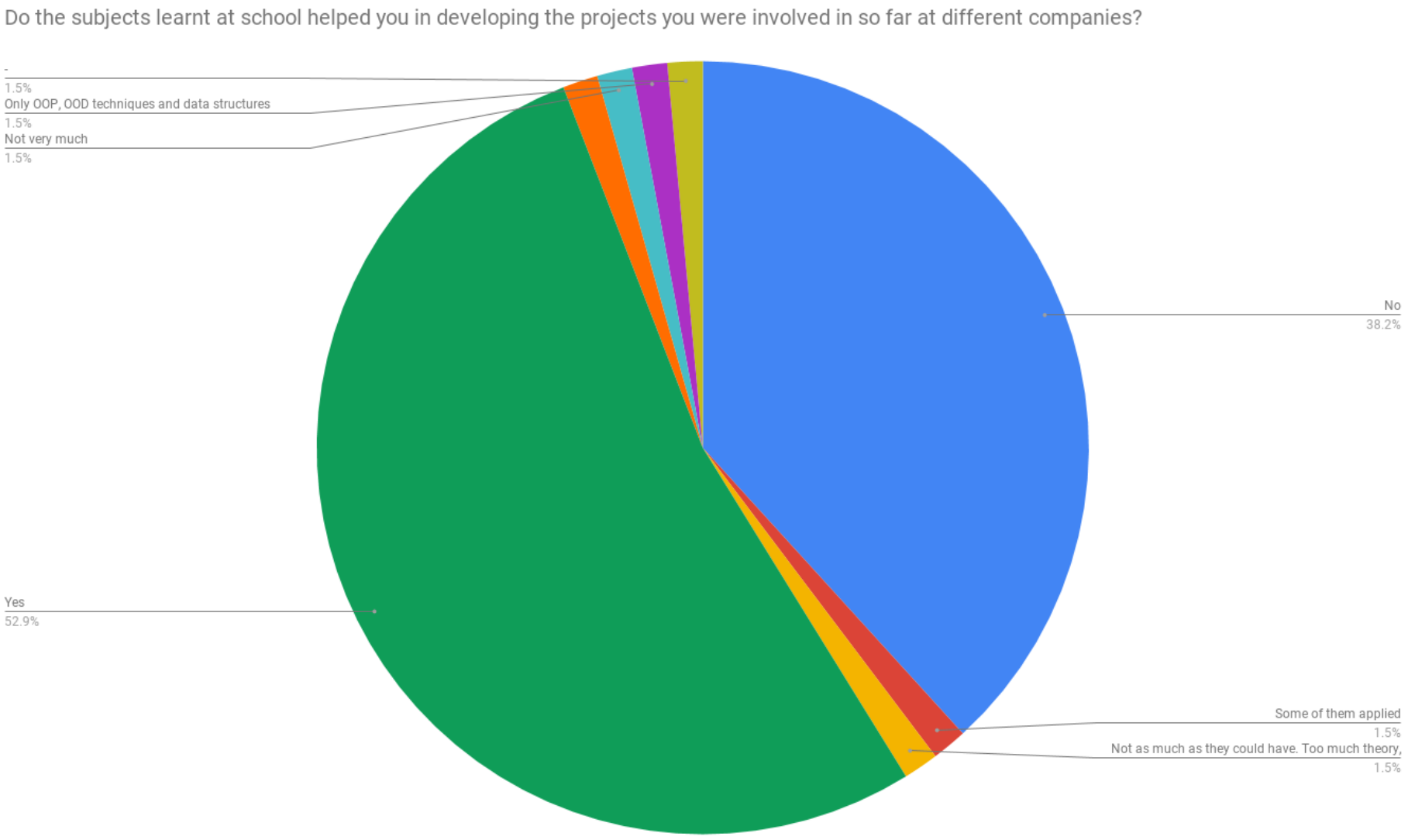
Testing mechanism



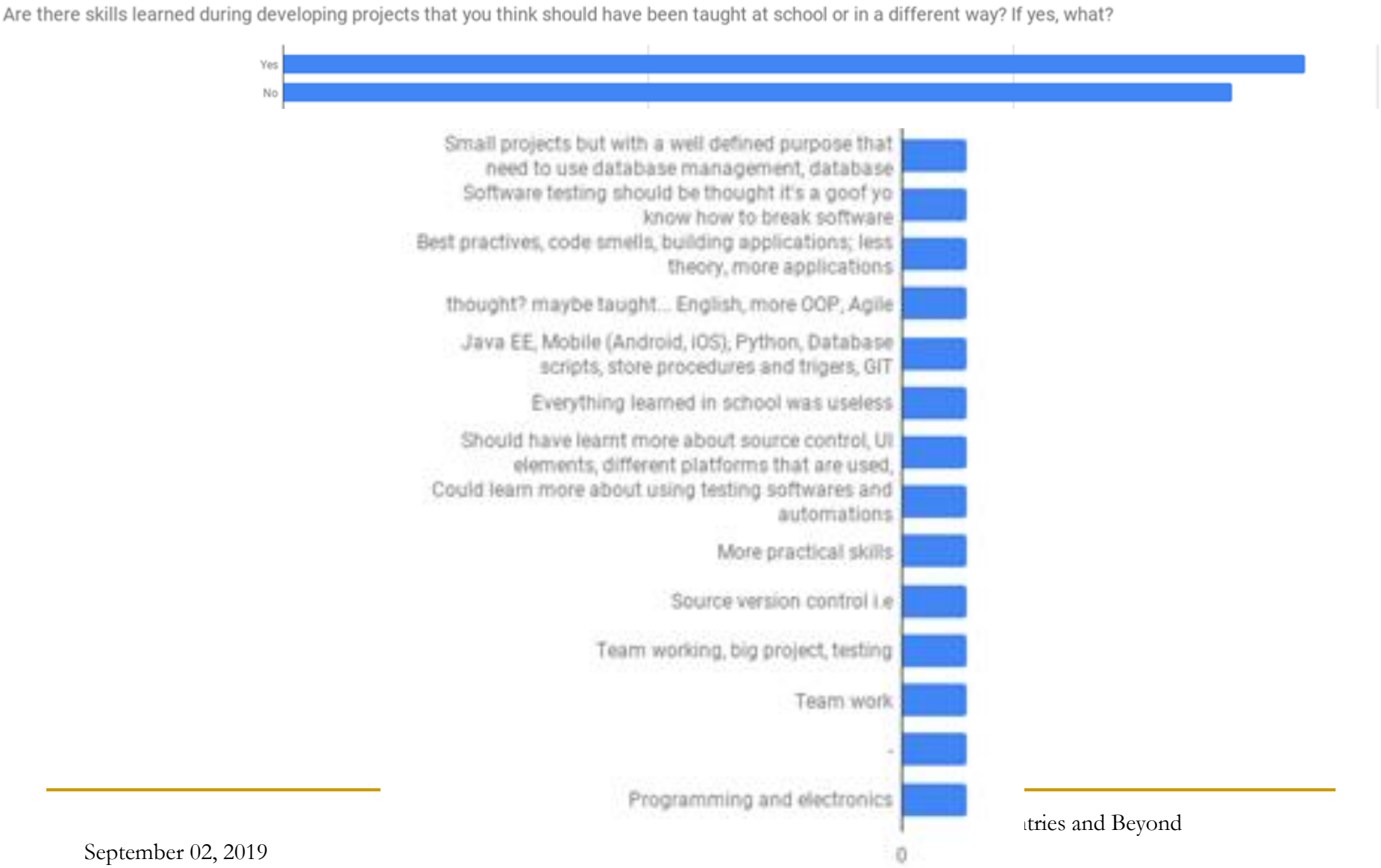
Better understanding of academic subjects



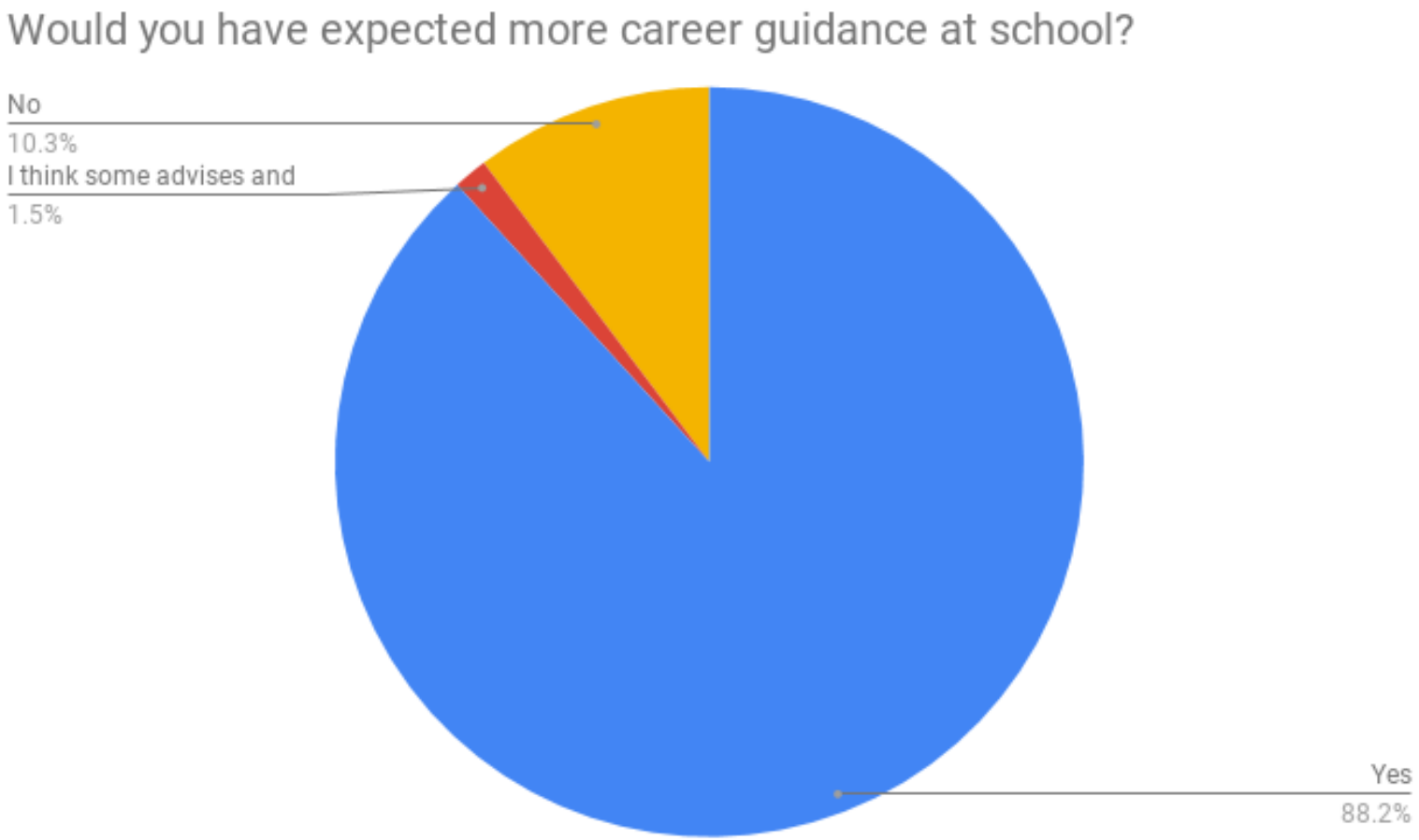
Did academic subjects helped in projects



Other useful skills



Career guidance at school



Competencies for company

- OOP, logical thinking, basic algorithms.
- English language mandatory, basic knowledge of C# / Java, design patterns
- Java EE, JSP, JSF2, Database skills, beginner skills in Linux commands, basic skills of networking
- Full stack Javascript knowledge and little mobile programming knowledge
- Web-programming and in the field of networking
- Programming language, electronics, embedded systems
- C knowledge, microcontrollers, CAN communication
- Level of Decision-Making, Responsibilities and Authorities
- Attention to details
- C, English, logical thinking
- Team work, task management

Skills would have helped being learned in the school?

- **Basic troubleshooting and investigation skills (debugging, profiling, etc.)**
- Internships, research projects to gain further experience about real-life projects
- Teamwork experience
- Business and / or domain knowledge in different areas (in addition to IT/Computer Science knowledge)

Discussion

- From 43 posed questions, we appreciated that only 36 questions had clear results.
- Unclear results were caused by:
  - Vaguely formulated questions
  - Not relevant questions / participant knowledge outside the scope of the question
- Examples of vagueness:
  - The students do not perceive the short-, medium-, and long-term company goals
  - Students are not involved in project management
  - Many students have software engineer or QA engineer role, but they do not know the correct name of their position

Conclusions

- Students worked in small, medium and large projects.
- Most of the time they worked in small teams of 3-6 members.
- Project duration was in almost half of situations of at most 6 months.

Conclusions

- Most students want more career guidance and implicitly more teamwork training, on real-life projects.
- Most students want to practice acquired knowledge on real-life projects, by observing the practical applicability of their knowledge
- There is a correlation between knowledge acquired in school with knowledge mastered in companies, although many students do not immediately observe the applicability into practice of academic knowledge. Working in a company helps to bridge this gap.


Thank You