

RCUK Funding

Introduction

This document will explore the distribution of research done by council in the UK, and how it has changed over time.

Links <http://www.rcuk.ac.uk/research/efficiency/successrates/>

Subjects by research council are described here:

Arts and Humanities Research Council (AHRC) The AHRC supports research across a wide subject domains including:

history (ancient, medieval and modern); classics; archaeology; modern languages and linguistics; English language and literature; the visual arts and media; librarianship, information and museum studies; philosophy, law, religious studies; music and creative and performing arts. Biotechnology and Biological Sciences Research Council (BBSRC) BBSRC funds research in the biosciences, in areas including:

Genomics, stem cell biology, and bio-nanotechnology, that provide a basis for new technologies in healthcare, food safety, plant and livestock breeding, and bio-processing; Whole organism biology relevant to the understanding of diet and health, ageing, animal health and welfare, infectious diseases and immunity, and crop productivity; Biological populations and systems that underpin agricultural sustainability, biodiversity and novel bio-based and renewable processes for energy and manufacturing.

Engineering and Physical Sciences Research Council (EPSRC) EPSRC supports fundamental research in the physical sciences through to more applied topics in engineering and technology. This includes research in the following areas: mathematics; chemistry; physics; materials science; engineering; computer science, including high performance computing; energy research; research into the built environment; information and communications technology; research into innovative manufacturing. Economic and Social Research Council (ESRC) ESRC funds social science and economic research across a wide of disciplines encompassing:

Demography and human geography Development studies Economics History Education Environmental planning Linguistics Management and business studies Political science and international studies Psychology Social anthropology Social policy Social work Sociology Law and legal studies Tools, technologies and methods

Medical Research Council (MRC) The MRC's remit covers the full range of medical research from studies of molecules to the implementation of research findings into clinical practice. This includes such topics as: the use of animals in research; antibiotic resistance; brain sciences; genomics and proteomics; health of the public; intensive care; patient safety research; stem cell research.

Natural Environment Research Council (NERC) NERC funds environmental research, survey and observation work across a wide spectrum of disciplines, including: the geo- and earth sciences, hydrology, soil science, atmospheric research and oceanography; biological and microbiological research on animal and plant biodiversity, population dynamics and ecology; climate change research; environmental chemistry and physics; satellite based Earth observation; polar research; management of land and natural resources.

Science and Technology Facilities Council (STFC) Amongst others, STFC's areas of research include: astronomy; computational science; energy; nuclear physics; particle physics; space science.

Source: <http://www.rcuk.ac.uk/research/Areas/>

Regional funding data

<http://www.rcuk.ac.uk/about/aboutrcs/research-funding-across-the-uk/>

Page

- success rates for grant funding <http://www.rcuk.ac.uk/research/efficiency/successrates/>

Provides separate links to

<http://www.ahrc.ac.uk/about/statistics/competitionstatistics/> http://www.bbsrc.ac.uk/funding/apply/post_award_overview.html <http://www.epsrc.ac.uk/funding/successrates/Pages/successrates.aspx> <http://www.esrc.ac.uk/about-us/strategy-and-priorities/demand-management/funding-decisions> <http://www.mrc.ac.uk/documents/xls-csv/success-rates/> <http://www.nerc.ac.uk/funding/application/howtoapply/success/> <http://www.stfc.ac.uk/funding/research-grants/>

Not at all standardized

Closest to usable information from THES article, 2016 <https://www.timeshighereducation.com/news/uk-grant-success-rates-prompt-worldwide-comparisons>

Table : overall UK research council success rates

```
require(tidyverse)
```

```
## Loading required package: tidyverse

## Loading tidyverse: ggplot2
## Loading tidyverse: tibble
## Loading tidyverse: tidyr
## Loading tidyverse: readr
## Loading tidyverse: purrr
## Loading tidyverse: dplyr

## Conflicts with tidy packages -----

## filter(): dplyr, stats
## lag():    dplyr, stats

overall_by_council <- tribble(
  ~council_name, ~n_applications, ~n_grants, ~success_pct, ~amount,
  "Arts & Humanities Research Council", 246, 68, 28, 29851958,
  "Biotechnology & Biological Sciences Research Council", 1621, 392, 24, 178719000,
  "Engineering & Physical Sciences Research Council", 2419, 786, 33, 509476006,
  "Economic & Social Research Council", 429, 52, 12, 24107303,
  "Medical Research Council", 1993, 402, 20, 283520000,
  "Natural Environment Research Council", 1036, 311, 30, 86871071
)
# For year 2016
```

Let's draw this as a neat table

```
require(knitr)
```

```
## Loading required package: knitr

## Warning: package 'knitr' was built under R version 3.4.2

kable(overall_by_council, caption = "UK Research Council Statistics, 2016")
```

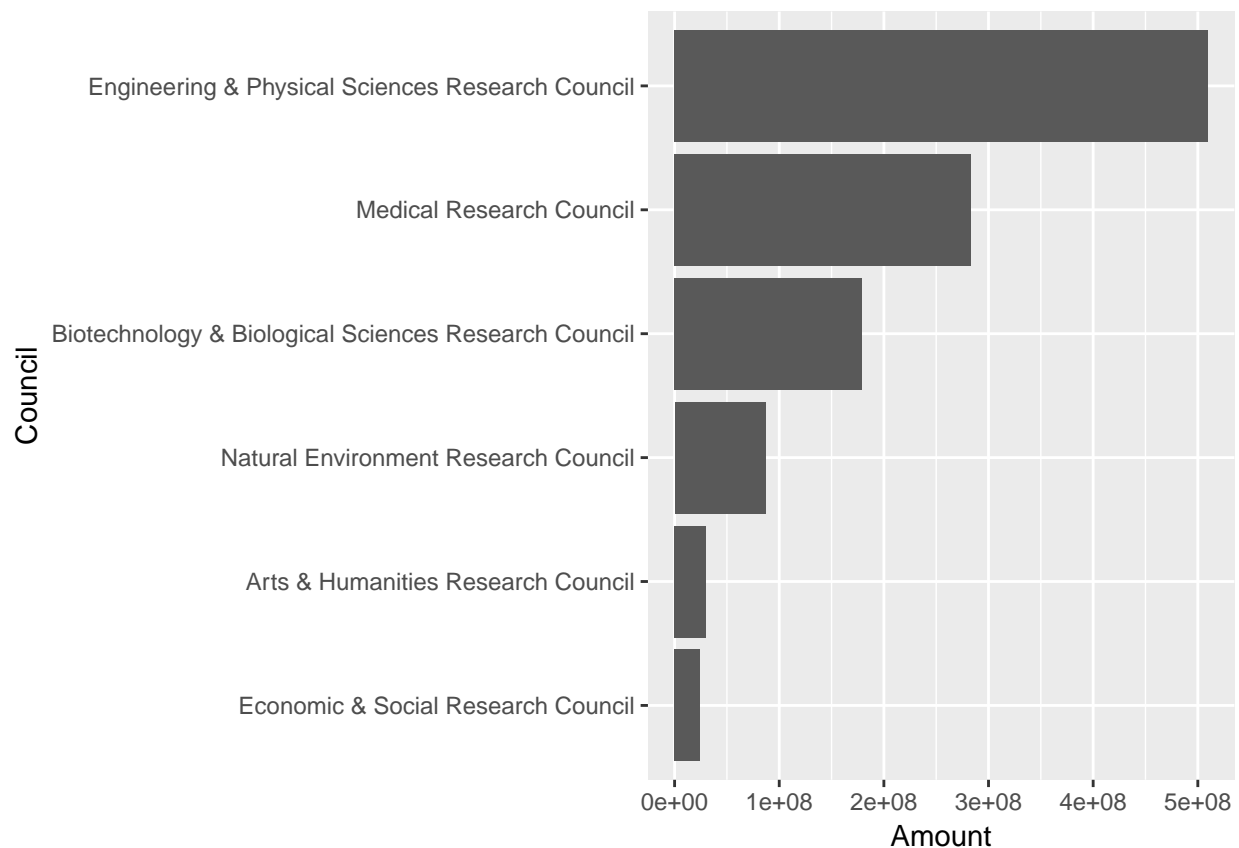
Table 1: UK Research Council Statistics, 2016

council_name	n_applications	n_grants	success_pct	amount
Arts & Humanities Research Council	246	68	28	29851958

council_name	n_applications	n_grants	success_pct	amount
Biotechnology & Biological Sciences Research Council	1621	392	24	178719000
Engineering & Physical Sciences Research Council	2419	786	33	509476006
Economic & Social Research Council	429	52	12	24107303
Medical Research Council	1993	402	20	283520000
Natural Environment Research Council	1036	311	30	86871071

Now to plot this

```
overall_by_council %>%
  ggplot(aes(x = forcats::fct_reorder(council_name, amount), y = amount)) +
  geom_bar(stat = "identity") +
  coord_flip() +
  labs(x = "Council", y = "Amount")
```



Let's try a treemap

```
require(treemap)
```

```
## Loading required package: treemap
```

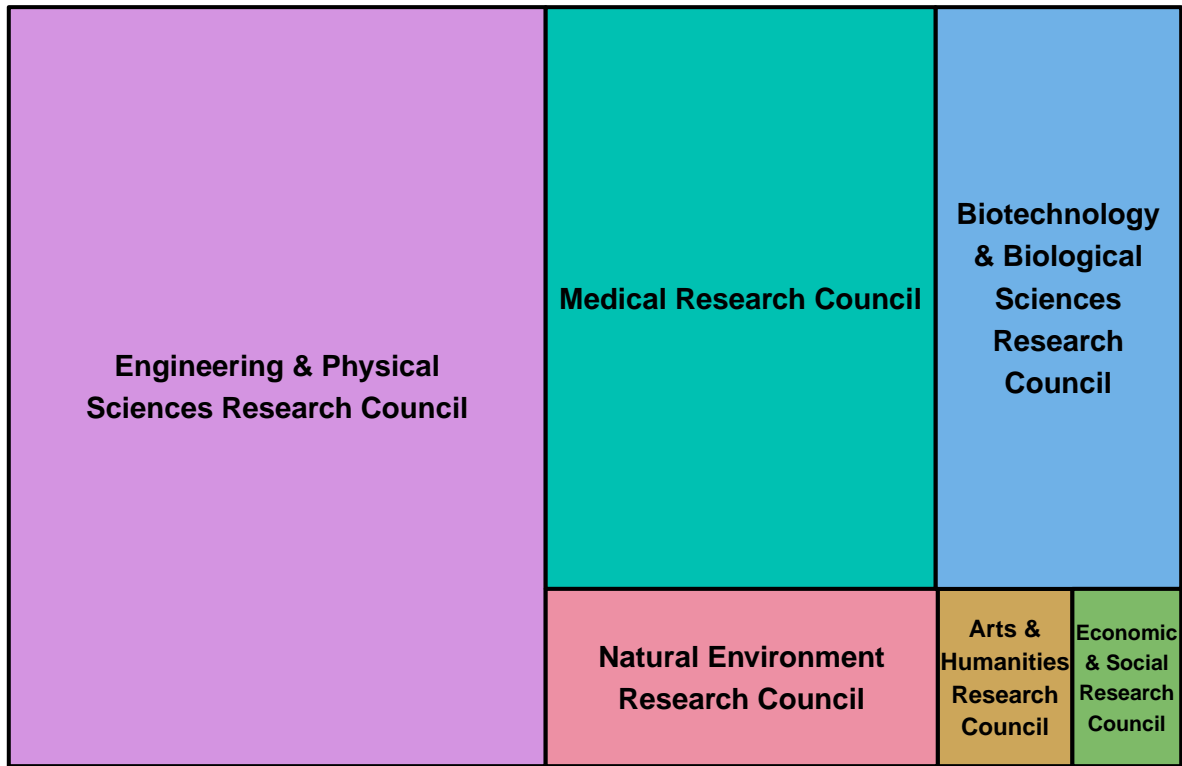
```
## Warning: package 'treemap' was built under R version 3.4.3
```

```
treemap(
  overall_by_council,
  index = "council_name",
  vSize = "amount",
```

```
title = "Research funding by council in 2016"
```

```
)
```

Research funding by council in 2016

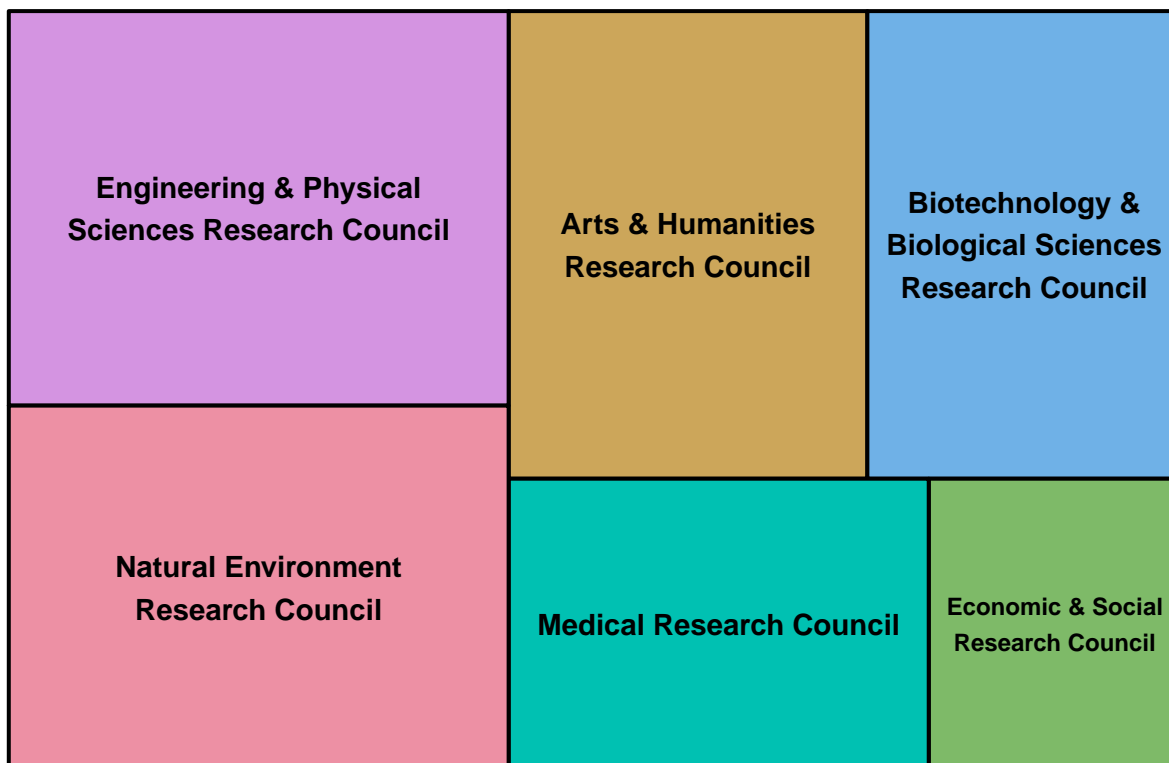


Now research grant success rates

```
overall_by_council %>%
  mutate(success_rate = n_grants / n_applications) %>%
  treemap(
    .,
    index = "council_name",
    vSize = "success_rate",
    title = "Grant success rates by council in 2016"
```

```
)
```

Grant success rates by council in 2016



Now let's look at the number of students who enter each subject

We have this data from the following location:

<https://www.hesa.ac.uk/news/11-01-2018/sfr247-higher-education-student-statistics/subjects>

```
read_csv(
  "data/sfr247-figure-14 (1).csv",
  skip = 13, col_names = F
) -> tmp
```

```
## Parsed with column specification:
## cols(
##   .default = col_character()
## )
## See spec(...) for full column specifications.
```

```
tmp[1,1] <- "year"
tmp[1,2:5] <- 2012
tmp[1,6:9] <- 2013
tmp[1, 10:13] <- 2014
tmp[1, 14:17] <- 2015
tmp[1, 18:21] <- 2016
tmp
```

```
## # A tibble: 24 x 21
```

```
##           X1      X2      X3      X4      X5      X6
##      <chr>  <chr>  <chr>  <chr>  <chr>  <chr>
```

```
## 1          year      2012    2012 2012    2012    2013
## 2          Subject Area Female   Male Other   Total Female
## 3      (1) Medicine & dentistry 37,435 29,255    0 66,690 37,875
## 4      (2) Subjects allied to medicine 222,240 57,495    10 279,745 217,185
## 5      (3) Biological sciences 123,010 78,245    80 201,335 126,160
## 6      (4) Veterinary science 4,350 1,410    0 5,760 4,515
## 7      (5) Agriculture & related subjects 11,455 7,505    0 18,960 11,010
## 8      (6) Physical sciences 37,045 55,790    5 92,840 36,910
## 9      (7) Mathematical sciences 16,325 25,850    5 42,185 16,025
## 10     (8) Computer science 15,530 73,945    5 89,480 15,645
## # ... with 14 more rows, and 15 more variables: X7 <chr>, X8 <chr>,
## #   X9 <chr>, X10 <chr>, X11 <chr>, X12 <chr>, X13 <chr>, X14 <chr>,
## #   X15 <chr>, X16 <chr>, X17 <chr>, X18 <chr>, X19 <chr>, X20 <chr>,
## #   X21 <chr>
```

```
tmp2 <- tmp[-1,]
names(tmp2) <- tmp[1,]
tmp2
```

```
## # A tibble: 23 x 21
##           year `2012` `2012` `2012` `2012`
##           <chr> <chr> <chr> <chr> <chr>
## 1          Subject Area Female   Male Other   Total
## 2      (1) Medicine & dentistry 37,435 29,255    0 66,690
## 3      (2) Subjects allied to medicine 222,240 57,495    10 279,745
## 4      (3) Biological sciences 123,010 78,245    80 201,335
## 5      (4) Veterinary science 4,350 1,410    0 5,760
## 6      (5) Agriculture & related subjects 11,455 7,505    0 18,960
## 7      (6) Physical sciences 37,045 55,790    5 92,840
## 8      (7) Mathematical sciences 16,325 25,850    5 42,185
## 9      (8) Computer science 15,530 73,945    5 89,480
## 10     (9) Engineering & technology 24,935 133,000    30 157,960
## # ... with 13 more rows, and 16 more variables: `2013` <chr>,
## #   `2013` <chr>, `2013` <chr>, `2013` <chr>, `2014` <chr>, `2014` <chr>,
## #   `2014` <chr>, `2014` <chr>, `2015` <chr>, `2015` <chr>, `2015` <chr>,
## #   `2015` <chr>, `2016` <chr>, `2016` <chr>, `2016` <chr>, `2016` <chr>
```

```
dta_tidy <- bind_rows(
  tmp %>% (function(..){
    .. %>%
      select(X1:X5) %>% mutate(year = 2012) %>% slice(-c(1,2)) -> ..
      names(..) <- c("subject", "female", "male", "other", "total", "year")
    ..
  }),
  tmp %>% (function(..){
    .. %>%
      select(X1, X6:X9) %>% mutate(year = 2013) %>% slice(-c(1,2)) -> ..
      names(..) <- c("subject", "female", "male", "other", "total", "year")
    ..
  }),
  tmp %>% (function(..){
    .. %>%
      select(X1, X10:X13) %>% mutate(year = 2014) %>% slice(-c(1,2)) -> ..
      names(..) <- c("subject", "female", "male", "other", "total", "year")
    ..
  })
)
```

```

}),
tmp %>% (function(..){
  .. %>%
    select(X1, X10:X13) %>% mutate(year = 2014) %>% slice(-c(1,2)) -> ..
    names(..) <- c("subject", "female", "male", "other", "total", "year")
  ..
}),
tmp %>% (function(..){
  .. %>%
    select(X1, X14:X17) %>% mutate(year = 2015) %>% slice(-c(1,2)) -> ..
    names(..) <- c("subject", "female", "male", "other", "total", "year")
  ..
}),
tmp %>% (function(..){
  .. %>%
    select(X1, X18:X21) %>% mutate(year = 2016) %>% slice(-c(1,2)) -> ..
    names(..) <- c("subject", "female", "male", "other", "total", "year")
  ..
})
) %>%
gather(female:total, key = gender, value = "number") %>%
mutate(number = number %>%
  stringr::str_replace(",", "") %>%
  as.numeric
)

```

Warning in function_list[[k]](value): NAs introduced by coercion

Now to get a lookup for students to research council

```

subject_council_lookup <- tribble(
  ~subject_name, ~council,
  "(1) Medicine & dentistry", "mrc",
  "(2) Subjects allied to medicine", "mrc",
  "(3) Biological sciences", "bbsrc",
  "(4) Veterinary science", "nerc",
  "(5) Agriculture & related subjects", "nerc",
  "(6) Physical sciences", "epsrc",
  "(7) Mathematical sciences", "epsrc",
  "(8) Computer science", "epsrc",
  "(9) Engineering & technology", "epsrc",
  "(A) Architecture, building & planning", "esrc",
  "(B) Social studies", "esrc",
  "(C) Law", "esrc",
  "(D) Business & administrative studies", "esrc",
  "(E) Mass communications & documentation", "esrc",
  "(F) Languages", "ahrc",
  "(G) Historical & philosophical studies", "arhc",
  "(H) Creative arts & design", "ahrc",
  "(I) Education", "esrc",
  "(J) Combined", NA
)

council_abbreviation_lookup <- tribble(
  ~abbreviation, ~full_name,

```

```

"mrc", "Medical Research Council",
"esrc", "Economic & Social Research Council",
"epsrc", "Engineering & Physical Sciences Research Council",
"nerc", "Natural Environment Research Council",
"ahrc", "Arts & Humanities Research Council",
"bbsrc", "Biotechnology & Biological Sciences Research Council"
)

```

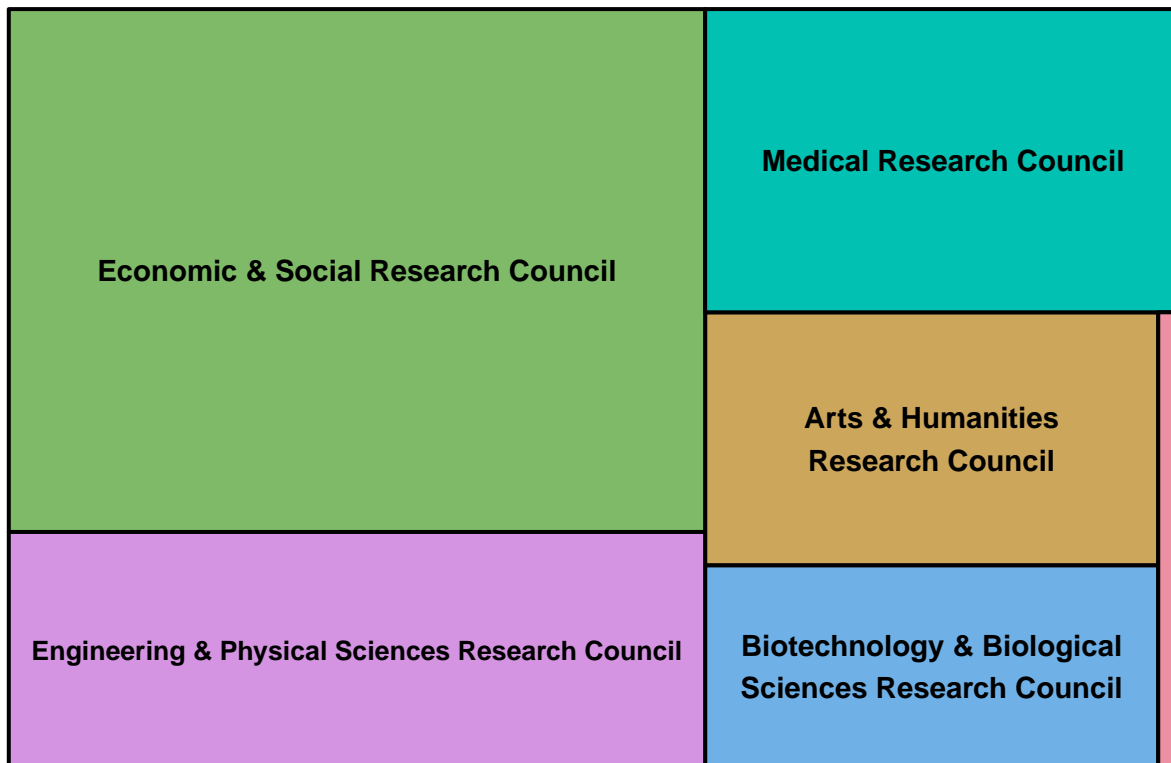
Now let's try to join the data

```

subject_council_lookup %>%
  inner_join(
    dta_tidy %>%
      filter(year == 2016) %>%
      filter(gender == "total"),
    by = c("subject_name"="subject")
  ) %>%
  group_by(council) %>%
  summarise(number = sum(number, na.rm = T)) %>%
  filter(!is.na(council)) %>%
  inner_join(
    council_abbreviation_lookup,
    by = c("council"="abbreviation")
  ) %>%
  treemap(
    .,
    index = "full_name",
    vSize = "number",
    title = "Approximate number of students by research council area"
  )

```


Approximate number of students by research council area



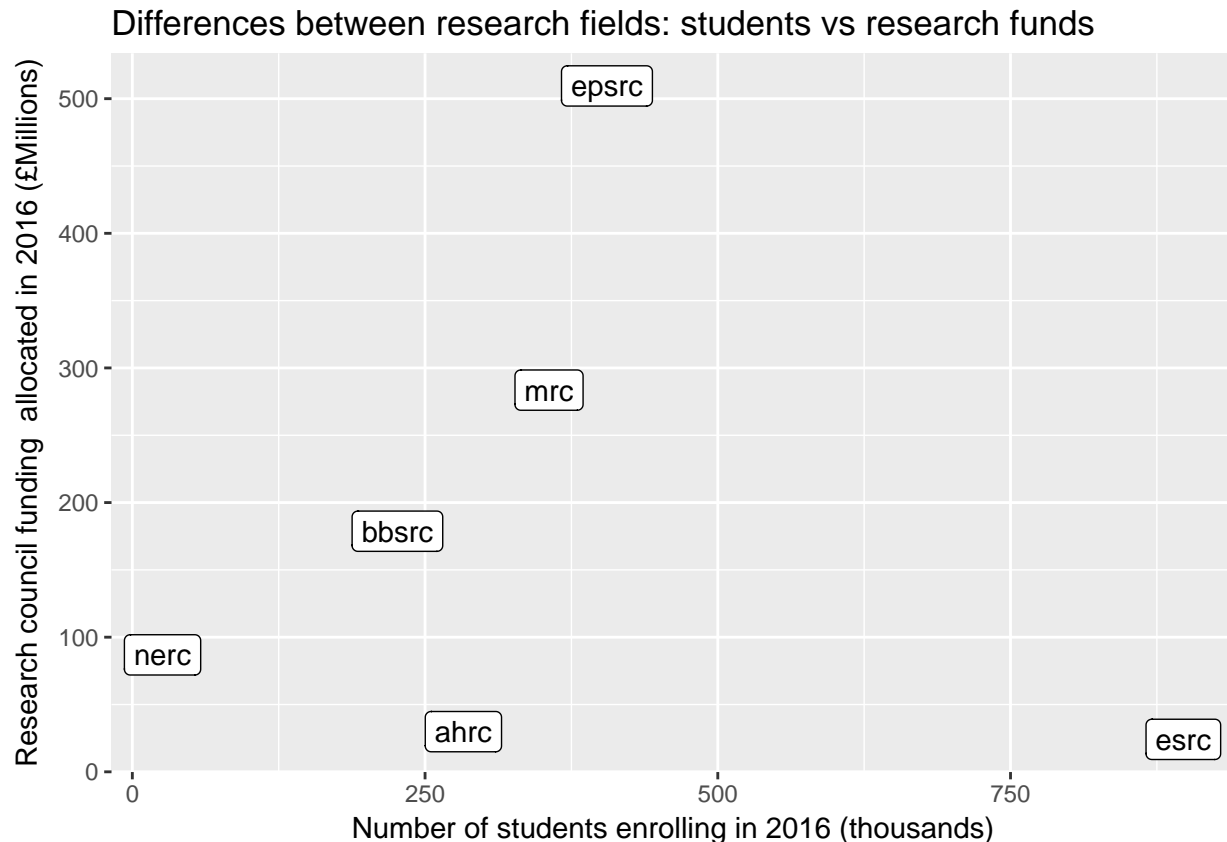
Now let's look at association

```
subject_council_lookup %>%
  inner_join(
    dta_tidy %>%
      filter(year == 2016) %>%
      filter(gender == "total"),
    by = c("subject_name"="subject")
  ) %>%
  group_by(council) %>%
  summarise(number = sum(number, na.rm = T)) %>%
  filter(!is.na(council)) %>%
  inner_join(
    council_abbreviation_lookup,
    by = c("council"="abbreviation")
  ) %>%
  left_join(
    overall_by_council %>% select(council_name, research_funding = amount),
    by = c("full_name"="council_name")
  ) %>%
  select(
    council_name = full_name,
    number_of_students = number,
    research_funding
  ) %>%
  left_join(
    council_abbreviation_lookup,
```

```

  by = c("council_name"="full_name")
) %>%
mutate(research_funding = research_funding / 1000000) %>%
mutate(number_of_students = number_of_students / 1000) %>%
ggplot(aes(x = number_of_students, y = research_funding, label = abbreviation)) +
geom_label() +
labs(y = "Research council funding allocated in 2016 (£Millions)",
     x = "Number of students enrolling in 2016 (thousands)",
     title = "Differences between research fields: students vs research funds"
)

```



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history (ancient, medieval and modern); classics; archaeology; modern languages and linguistics; English language and literature; the visual arts and media; librarianship, information and museum studies; philosophy, law, religious studies; music and creative and performing arts.

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Science and Technology Facilities Council (STFC) Amongst others, STFC's areas of research include: astronomy; computational science; energy; nuclear physics; particle physics; space science.

Source: <http://www.rcuk.ac.uk/research/Areas/>