Snowball Search and global quantification of the references

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# 1. Setup

#|  
  
library(bibtex)  
library(openalexR)

Thank you for using openalexR!  
To acknowledge our work, please cite the package by calling  
`citation("openalexR")`.

library(writexl)  
# library(dplyr)  
# library(ggplot2)  
# library(knitr)  
  
kp <- bibtex::read.bib("./key-paper.bib")  
dois <- sapply(  
 kp,  
 function(x) {  
 x$doi  
 }  
)

# 2. Searches

## 2.1 OpenAlex

### 2.1.1 Setup OpelAnex usage and do snowball serarch

#|  
  
library(ggraph)

Loading required package: ggplot2

library(tidygraph)

Attaching package: 'tidygraph'

The following object is masked from 'package:stats':  
  
 filter

key\_works <- oa\_fetch(  
 entity = "works",  
 doi = dois,  
 verbose = FALSE  
)  
  
ids <- openalexR:::shorten\_oaid(key\_works$id)  
  
citing\_kp <- lapply(  
 ids,  
 function(id) {  
 oa\_fetch(  
 entity = "works",  
 output = "tibble",  
 cites = id,  
 verbose = FALSE  
 )  
 }  
)

Warning in oa\_fetch(entity = "works", output = "tibble", cites = id, verbose =  
FALSE): No collection found!

names(citing\_kp) <- ids  
  
cited\_by\_kp <- lapply(  
 ids,  
 function(id) {  
 oa\_fetch(  
 entity = "works",  
 output = "tibble",  
 cited\_by = id,  
 verbose = FALSE  
 )  
 }  
)  
names(cited\_by\_kp) <- ids  
  
if (file.exists("snowball.rds")) {  
 snowball <- readRDS("snowball.rds")  
} else {  
 snowball <- oa\_snowball(  
 identifier = ids,  
 verbose = FALSE  
 )  
 saveRDS(snowball, "snowball.rds")  
}  
  
flat\_snow <- snowball2df(snowball) |>  
 as\_tibble()

### 2.1.2 Save snowball as Excel file (snowball\_excel.xlsx)

###  
no\_edges <- snowball$edges |>  
 unlist() |>  
 table() |>  
 sort() |>  
 as.data.frame() |>  
 rename(  
 no\_connections = Freq,  
 id = Var1  
 )  
  
###  
no\_referenced\_works <- sapply(  
 snowball$node["referenced\_works"][[1]],  
 length  
)  
  
no\_referenced\_works <- data.frame(  
 id = snowball$node["id"],  
 no\_referenced\_works = no\_referenced\_works  
)  
  
###  
citations\_per\_year <- flat\_snow |>  
 select(  
 id,  
 publication\_year,  
 cited\_by\_count  
 ) |>  
 mutate(  
 years\_published = 2023 - publication\_year  
 ) |>  
 mutate(  
 avg\_citations\_per\_year = cited\_by\_count / years\_published  
 ) |>  
 arrange(desc(cited\_by\_count)) |>  
 select(  
 id,  
 avg\_citations\_per\_year  
 ) |>  
 rename(cited\_global\_per\_year = avg\_citations\_per\_year)  
  
###  
  
export <- flat\_snow |>  
 select(  
 id,  
 publication\_year,  
 display\_name,  
 doi,  
 cited\_by\_count,  
 ab  
 ) |>  
 rename(  
 cited\_global = cited\_by\_count,  
 title = display\_name,  
 abstract = ab  
 )  
  
  
export$author <- sapply(  
 flat\_snow$author,  
 function(z) {  
 paste(unlist(z["au\_display\_name"]), collapse = ", ")  
 }  
)  
  
  
export$author\_institute <- sapply(  
 flat\_snow$author,  
 function(z) {  
 paste(unlist(z["institution\_display\_name"]), collapse = ", ")  
 }  
)  
  
  
export$institute\_country <- sapply(  
 flat\_snow$author,  
 function(z) {  
 paste(unlist(z["institution\_country\_code"]), collapse = ", ")  
 }  
)  
  
  
concepts <- lapply(  
 flat\_snow$concepts,  
 function(x){  
 x |>   
 select(level, display\_name, score)  
 }  
)  
  
export$concepts\_l0 <- sapply(  
 concepts,  
 function(x) {  
 x |>  
 filter(level == 0) |>  
 mutate(name = paste0(display\_name, " (", round(score, digits = 3), ")")) |>  
 select(name) |>  
 unlist() |>  
 paste0(collapse = ", ")  
 }  
)  
  
export$concepts\_l1 <- sapply(  
 concepts,  
 function(x) {  
 x |>  
 filter(level == 1) |>  
 mutate(name = paste0(display\_name, " (", round(score, digits = 3), ")")) |>  
 select(name) |>  
 unlist() |>  
 paste0(collapse = ", ")  
 }  
)  
  
export$concepts\_l2 <- sapply(  
 concepts,  
 function(x) {  
 x |>  
 filter(level == 2) |>  
 mutate(name = paste0(display\_name, " (", round(score, digits = 3), ")")) |>  
 select(name) |>  
 unlist() |>  
 paste0(collapse = ", ")  
 }  
)  
  
export$concepts\_l3 <- sapply(  
 concepts,  
 function(x) {  
 x |>  
 filter(level == 3) |>  
 mutate(name = paste0(display\_name, " (", round(score, digits = 3), ")")) |>  
 select(name) |>  
 unlist() |>  
 paste0(collapse = ", ")  
 }  
)  
  
export$concepts\_l4 <- sapply(  
 concepts,  
 function(x) {  
 x |>  
 filter(level == 4) |>  
 mutate(name = paste0(display\_name, " (", round(score, digits = 3), ")")) |>  
 select(name) |>  
 unlist() |>  
 paste0(collapse = ", ")  
 }  
)  
  
export$concepts\_l5 <- sapply(  
 concepts,  
 function(x) {  
 x |>  
 filter(level == 5) |>  
 mutate(name = paste0(display\_name, " (", round(score, digits = 3), ")")) |>  
 select(name) |>  
 unlist() |>  
 paste0(collapse = ", ")  
 }  
)  
  
  
xlsx <- export |>  
 full\_join(no\_edges, by = "id") |>  
 full\_join(no\_referenced\_works, by = "id") |>  
 full\_join(citations\_per\_year, by = "id") |>  
 dplyr::relocate(author, .after = id) |>  
 arrange(desc(cited\_global))  
  
la <- xlsx$abstract |>  
 nchar() >= 3000  
  
xlsx$abstract[la] <- substr(xlsx$abstract[la], 1, 3000)  
  
xlsx |>  
 dplyr::relocate(cited\_global\_per\_year, .after = cited\_global) |>  
 dplyr::relocate(no\_referenced\_works, .after = doi) |>  
 dplyr::relocate(no\_connections, .before = abstract) |>  
 dplyr::relocate(concepts\_l0, .before = abstract) |>  
 dplyr::relocate(concepts\_l1, .before = abstract) |>  
 dplyr::relocate(concepts\_l2, .before = abstract) |>  
 dplyr::relocate(concepts\_l3, .before = abstract) |>  
 dplyr::relocate(concepts\_l4, .before = abstract) |>  
 dplyr::relocate(concepts\_l5, .before = abstract) |>  
 dplyr::relocate(author\_institute, .before = abstract) |>  
 dplyr::relocate(institute\_country, .before = abstract) |>  
 writexl::write\_xlsx(file.path(".", "data", "snowball\_excel.xlsx"))

### 2.1.3 Graph of links between references

#|  
  
snowball$nodes$cited\_by\_count\_by\_year <- snowball$nodes$cited\_by\_count / (2024 - snowball$nodes$publication\_year)  
  
### Size cited\_by\_count\_by\_year  
p\_cby <- snowball |>  
 as\_tbl\_graph() |>  
 ggraph(graph = , layout = "stress") +  
 geom\_edge\_link(aes(alpha = after\_stat(index)), show.legend = FALSE) +  
 geom\_node\_point(aes(fill = oa\_input, size = cited\_by\_count\_by\_year), shape = 21, color = "white") +  
 geom\_node\_label(aes(filter = oa\_input, label = id), nudge\_y = 0.2, size = 3) +  
 scale\_edge\_width(range = c(0.1, 1.5), guide = "none") +  
 scale\_size(range = c(3, 10), guide = "none") +  
 scale\_fill\_manual(values = c("#a3ad62", "#d46780"), na.value = "grey", name = "") +  
 theme\_graph() +  
 theme(  
 plot.background = element\_rect(fill = "transparent", colour = NA),  
 panel.background = element\_rect(fill = "transparent", colour = NA),  
 legend.position = "bottom"  
 ) +  
 guides(fill = "none") +  
 ggtitle("Cited by average count per year")  
  
ggsave("cited\_by\_count\_by\_year.pdf", plot = p\_cby, device = cairo\_pdf, width = 20, height = 15)

Warning: Using the `size` aesthetic in this geom was deprecated in ggplot2 3.4.0.  
ℹ Please use `linewidth` in the `default\_aes` field and elsewhere instead.

ggsave("cited\_by\_count\_by\_year.png", plot = p\_cby, width = 20, height = 15, bg = "white")  
  
### Size cited\_by\_count  
p\_cb <- snowball |>  
 as\_tbl\_graph() |>  
 ggraph(graph = , layout = "stress") +  
 geom\_edge\_link(aes(alpha = after\_stat(index)), show.legend = FALSE) +  
 geom\_node\_point(aes(fill = oa\_input, size = cited\_by\_count), shape = 21, color = "white") +  
 geom\_node\_label(aes(filter = oa\_input, label = id), nudge\_y = 0.2, size = 3) +  
 scale\_edge\_width(range = c(0.1, 1.5), guide = "none") +  
 scale\_size(range = c(3, 10), guide = "none") +  
 scale\_fill\_manual(values = c("#a3ad62", "#d46780"), na.value = "grey", name = "") +  
 theme\_graph() +  
 theme(  
 plot.background = element\_rect(fill = "transparent", colour = NA),  
 panel.background = element\_rect(fill = "transparent", colour = NA),  
 legend.position = "bottom"  
 ) +  
 guides(fill = "none") +  
 ggtitle("Cited by count")  
  
ggsave("cited\_by\_count.pdf", plot = p\_cb, device = cairo\_pdf, width = 20, height = 15)  
ggsave("cited\_by\_count.png", plot = p\_cb, width = 20, height = 15, bg = "white")

### 2.1.4 Identification of references with more than one edge

This is the number of connections (connection\_count)of the paper (id)

#|  
  
mult\_edge <- flat\_snow |>  
 select(id, connection\_count) |>  
 filter(connection\_count > 1) |>  
 arrange(desc(connection\_count))  
  
links <- flat\_snow |>  
 filter(id %in% mult\_edge$id)  
  
links |>  
 select(id, display\_name, publication\_year, doi, connection\_count) |>  
 arrange(desc(connection\_count)) |>  
 knitr::kable()

| id | display\_name | publication\_year | doi | connection\_count |
| --- | --- | --- | --- | --- |
| W2204133637 | Sustainability Transitions Research: Transforming Science and Practice for Societal Change | 2017 | https://doi.org/10.1146/annurev-environ-102014-021340 | 737 |
| W2520670351 | Exploring the governance and politics of transformations towards sustainability | 2017 | https://doi.org/10.1016/j.eist.2016.09.001 | 526 |
| W2020319093 | Societal transformation in response to global environmental change: A review of emerging concepts | 2014 | https://doi.org/10.1007/s13280-014-0582-z | 441 |
| W3001406994 | Transformations to sustainability: combining structural, systemic and enabling approaches | 2020 | https://doi.org/10.1016/j.cosust.2019.12.004 | 291 |
| W4220786370 | Critical social science perspectives on transformations to sustainability | 2022 | https://doi.org/10.1016/j.cosust.2022.101160 | 69 |
| W4379647013 | Untangling theories of transformation: Reflections for ocean governance | 2023 | https://doi.org/10.1016/j.marpol.2023.105710 | 55 |
| W2127569725 | Resilience Thinking: Integrating Resilience, Adaptability and Transformability | 2010 | https://doi.org/10.5751/es-03610-150420 | 5 |
| W2127643778 | Global environmental change II | 2011 | https://doi.org/10.1177/0309132511425767 | 5 |
| W2883507226 | The Dark Side of Transformation: Latent Risks in Contemporary Sustainability Discourse | 2018 | https://doi.org/10.1111/anti.12405 | 5 |
| W4362573725 | (Re)framing technology: The evolution from biogas to biomethane in Austria | 2023 | https://doi.org/10.1016/j.eist.2023.100724 | 5 |
| W2078778096 | Transformational adaptation when incremental adaptations to climate change are insufficient | 2012 | https://doi.org/10.1073/pnas.1115521109 | 4 |
| W2156304718 | Typology of sociotechnical transition pathways | 2007 | https://doi.org/10.1016/j.respol.2007.01.003 | 4 |
| W2274815048 | Resilience, Adaptability and Transformability in Social-ecological Systems | 2004 | https://doi.org/10.5751/es-00650-090205 | 4 |
| W2315897902 | Sustainability transformations: a resilience perspective | 2014 | https://doi.org/10.5751/es-06799-190401 | 4 |
| W2790286726 | A perspective on radical transformations to sustainability: resistances, movements and alternatives | 2018 | https://doi.org/10.1007/s11625-018-0543-8 | 4 |
| W2804856255 | Transition versus transformation: What’s the difference? | 2018 | https://doi.org/10.1016/j.eist.2017.10.007 | 4 |
| W2960049244 | Just Transformations to Sustainability | 2019 | https://doi.org/10.3390/su11143881 | 4 |
| W2966770423 | Socio-technical transitions to sustainability: a review of criticisms and elaborations of the Multi-Level Perspective | 2019 | https://doi.org/10.1016/j.cosust.2019.06.009 | 4 |
| W3030603415 | Scaling the impact of sustainability initiatives: a typology of amplification processes | 2020 | https://doi.org/10.1186/s42854-020-00007-9 | 4 |
| W3136925335 | Fostering bottom-up actor coalitions for transforming complex rural territorial pathways | 2021 | https://doi.org/10.1016/j.cosust.2021.02.001 | 4 |
| W3154787182 | Transformation beyond conservation: how critical social science can contribute to a radical new agenda in biodiversity conservation | 2021 | https://doi.org/10.1016/j.cosust.2021.03.005 | 4 |
| W3163183782 | Assessing nature-based solutions for transformative change | 2021 | https://doi.org/10.1016/j.oneear.2021.04.013 | 4 |
| W3185847870 | The role of data in transformations to sustainability: a critical research agenda | 2021 | https://doi.org/10.1016/j.cosust.2021.06.009 | 4 |
| W4200343243 | Exploring the transformative potential of urban food | 2021 | https://doi.org/10.1038/s42949-021-00041-x | 4 |
| W4281563038 | The Urgency of Transforming Biodiversity Governance | 2022 | https://doi.org/10.1017/9781108856348.002 | 4 |
| W4379231521 | Unlocking and accelerating transformations to the SDGs: a review of existing knowledge | 2023 | https://doi.org/10.1007/s11625-023-01342-z | 4 |
| W4386384026 | The lifeways of small-scale gold miners: Addressing sustainability transformations | 2023 | https://doi.org/10.1016/j.gloenvcha.2023.102724 | 4 |
| W1976759885 | ADAPTIVE GOVERNANCE OF SOCIAL-ECOLOGICAL SYSTEMS | 2005 | https://doi.org/10.1146/annurev.energy.30.050504.144511 | 3 |
| W2009175240 | Caution! Transitions Ahead: Politics, Practice, and Sustainable Transition Management | 2007 | https://doi.org/10.1068/a39310 | 3 |
| W2011303397 | Resilience and Stability of Ecological Systems | 1973 | https://doi.org/10.1146/annurev.es.04.110173.000245 | 3 |
| W2048226523 | Action, research and participation: roles of researchers in sustainability transitions | 2014 | https://doi.org/10.1007/s11625-014-0258-4 | 3 |
| W2067441067 | Engaging with the politics of sustainability transitions | 2011 | https://doi.org/10.1016/j.eist.2011.02.003 | 3 |
| W2096885696 | A safe operating space for humanity | 2009 | https://doi.org/10.1038/461472a | 3 |
| W2099330597 | Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study | 2002 | https://doi.org/10.1016/s0048-7333(02)00062-8 | 3 |
| W2130677668 | Tipping Toward Sustainability: Emerging Pathways of Transformation | 2011 | https://doi.org/10.1007/s13280-011-0186-9 | 3 |
| W2772946006 | Innovation Systems for Transformations towards Sustainability? Taking the Normative Dimension Seriously | 2017 | https://doi.org/10.3390/su9122253 | 3 |
| W2800906030 | Is the 1.5°C target possible? Exploring the three spheres of transformation | 2018 | https://doi.org/10.1016/j.cosust.2018.04.010 | 3 |
| W2904914354 | Unpacking social-ecological transformations: Conceptual, ethical and methodological insights | 2018 | https://doi.org/10.1177/2053019618817928 | 3 |
| W2918193929 | Capitalism in sustainability transitions research: Time for a critical turn? | 2020 | https://doi.org/10.1016/j.eist.2019.02.005 | 3 |
| W3036820224 | Sustainability transformations: socio-political shocks as opportunities for governance transitions | 2020 | https://doi.org/10.1016/j.gloenvcha.2020.102097 | 3 |
| W3044590679 | Sustainability-oriented labs in real-world contexts: An exploratory review | 2020 | https://doi.org/10.1016/j.jclepro.2020.123202 | 3 |
| W3081355632 | A Transformative Perspective on Climate Change and Climate Governance | 2020 | https://doi.org/10.1007/978-3-030-49040-9\_1 | 3 |
| W3082596907 | Four approaches to anticipatory climate governance: Different conceptions of the future and implications for the present | 2020 | https://doi.org/10.1002/wcc.673 | 3 |
| W3089192400 | Recurring droughts or social shifts? Exploring drivers of large-scale transformations in a transformed country | 2020 | https://doi.org/10.1016/j.gloenvcha.2020.102157 | 3 |
| W3090562667 | Sustainable agriculture: Recognizing the potential of conflict as a positive driver for transformative change | 2020 | https://doi.org/10.1016/bs.aecr.2020.08.003 | 3 |
| W3108934821 | A leverage points perspective on social networks to understand sustainability transformations: evidence from Southern Transylvania | 2020 | https://doi.org/10.1007/s11625-020-00881-z | 3 |
| W3138695700 | Transformational adaptation in drylands | 2021 | https://doi.org/10.1016/j.cosust.2021.03.003 | 3 |
| W3157054384 | The migration-sustainability paradox: transformations in mobile worlds | 2021 | https://doi.org/10.1016/j.cosust.2021.03.013 | 3 |
| W3183047539 | Critical Reflexivity in Political Ecology Research: How can the Covid-19 Pandemic Transform us Into Better Researchers? | 2021 | https://doi.org/10.3389/fhumd.2021.652968 | 3 |
| W3204417470 | Crisis, transformation, and agency: Why are people going back-to-the-land in Greece? | 2021 | https://doi.org/10.1007/s11625-021-01043-5 | 3 |
| W3206417499 | Enacting theories of change for food systems transformation under climate change | 2021 | https://doi.org/10.1016/j.gfs.2021.100583 | 3 |
| W4205298166 | Democratising sustainability transformations: Assessing the transformative potential of democratic practices in environmental governance | 2022 | https://doi.org/10.1016/j.esg.2021.100131 | 3 |
| W4210526291 | Sustainable market transformation: A refined framework for analyzing causal loops in transitions to sustainability | 2022 | https://doi.org/10.1016/j.eist.2022.01.010 | 3 |
| W4212926313 | Systemic Transition | 2020 | https://doi.org/10.1007/978-3-030-02006-4\_433-1 | 3 |
| W4214711221 | Transforming environmental governance: critical action intellectuals and their praxis in the field | 2022 | https://doi.org/10.1007/s11625-022-01108-z | 3 |
| W4224269837 | Exploring the Love Triangle of Authoritarianism, Populism, and COVID-19 Through Political Ecology: Time for a Break-Up? | 2022 | https://doi.org/10.3389/fhumd.2022.653990 | 3 |
| W4234459924 | Transitions to Sustainable Development | 2019 | https://doi.org/10.1007/978-3-319-71058-7\_52-1 | 3 |
| W4236504206 | Transitions to Sustainable Development | 2020 | https://doi.org/10.1007/978-3-319-95867-5\_52 | 3 |
| W4281571651 | Prospects of Low Trophic Marine Aquaculture Contributing to Food Security in a Net Zero-Carbon World | 2022 | https://doi.org/10.3389/fsufs.2022.875509 | 3 |
| W4281628495 | Systems thinking as a paradigm shift for sustainability transformation | 2022 | https://doi.org/10.1016/j.gloenvcha.2022.102544 | 3 |
| W4285107485 | Disrupting the governance of social-ecological rigidity traps: Can pluralism foster change towards sustainability? | 2022 | https://doi.org/10.1016/bs.aecr.2022.04.011 | 3 |
| W4292186320 | Editorial: Discussing structural, systemic and enabling approaches to socio-environmental transformations: Stimulating an interdisciplinary and plural debate within the social sciences | 2022 | https://doi.org/10.3389/fsoc.2022.968018 | 3 |
| W4293173604 | Understanding the social enablers and disablers of pesticide reduction and agricultural transformation | 2022 | https://doi.org/10.1016/j.jrurstud.2022.07.023 | 3 |
| W4308158291 | Just and sustainable transformed agricultural landscapes: An analysis based on local food actors’ ideal visions of agriculture | 2023 | https://doi.org/10.1016/j.agee.2022.108236 | 3 |
| W4367316381 | Toward a systemic approach to energy transformation in Algeria | 2023 | https://doi.org/10.1007/s41207-023-00367-1 | 3 |
| W4377690785 | Rural politics in undemocratic times: Exploring the emancipatory potential of small rural initiatives in authoritarian Hungary | 2023 | https://doi.org/10.1016/j.geoforum.2023.103766 | 3 |
| W4383558737 | Political dimensions of social-ecological transformations: polity, politics, policy | 2023 | https://doi.org/10.1080/15487733.2023.2222612 | 3 |
| W1964510407 | Adaptation and transformation | 2014 | https://doi.org/10.1007/s10584-014-1303-0 | 2 |
| W1968852409 | Diagnosing transformative change in urban water systems: Theories and frameworks | 2013 | https://doi.org/10.1016/j.gloenvcha.2012.07.008 | 2 |
| W1979877174 | Toward a spatial perspective on sustainability transitions | 2012 | https://doi.org/10.1016/j.respol.2012.02.014 | 2 |
| W1982748232 | Transdisciplinary research in sustainability science: practice, principles, and challenges | 2012 | https://doi.org/10.1007/s11625-011-0149-x | 2 |
| W1990722542 | Patterns in transitions: Understanding complex chains of change | 2011 | https://doi.org/10.1016/j.techfore.2010.10.008 | 2 |
| W1998431836 | Informing adaptation responses to climate change through theories of transformation | 2012 | https://doi.org/10.1016/j.gloenvcha.2011.10.003 | 2 |
| W1999167944 | Planetary boundaries: Guiding human development on a changing planet | 2015 | https://doi.org/10.1126/science.1259855 | 2 |
| W2000485484 | Simple models, powerful ideas: Towards effective integrative practice | 2012 | https://doi.org/10.1016/j.gloenvcha.2012.03.006 | 2 |
| W2007762019 | Contextualizing Reflexive Governance: the Politics of Dutch Transitions to Sustainability | 2007 | https://doi.org/10.1080/15239080701622790 | 2 |
| W2011880877 | The practice of transition management: Examples and lessons from four distinct cases | 2010 | https://doi.org/10.1016/j.futures.2009.11.009 | 2 |
| W2030655414 | The economics of degrowth | 2012 | https://doi.org/10.1016/j.ecolecon.2012.08.017 | 2 |
| W2037833995 | Governance, complexity, and resilience | 2010 | https://doi.org/10.1016/j.gloenvcha.2010.04.006 | 2 |
| W2052509076 | Studying the complexity of change: toward an analytical framework for understanding deliberate social-ecological transformations | 2014 | https://doi.org/10.5751/es-06966-190454 | 2 |
| W2094701299 | A socio-metabolic transition towards sustainability? Challenges for another Great Transformation | 2011 | https://doi.org/10.1002/sd.410 | 2 |
| W2097137610 | Pluralising progress: From integrative transitions to transformative diversity | 2011 | https://doi.org/10.1016/j.eist.2011.03.005 | 2 |
| W2099776967 | Navigating transformations in governance of Chilean marine coastal resources | 2010 | https://doi.org/10.1073/pnas.1012021107 | 2 |
| W2116805608 | Conceptualizing, Observing, and Influencing Social&#8211;Ecological Transitions | 2009 | https://doi.org/10.5751/es-02857-140203 | 2 |
| W2117275101 | Strategic niche management and sustainable innovation journeys: theory, findings, research agenda, and policy | 2008 | https://doi.org/10.1080/09537320802292651 | 2 |
| W2122963205 | Environmental innovation and societal transitions: Introduction and overview | 2011 | https://doi.org/10.1016/j.eist.2011.04.010 | 2 |
| W2130268098 | Social Theory and Climate Change | 2010 | https://doi.org/10.1177/0263276410361498 | 2 |
| W2142130708 | Designing long-term policy: rethinking transition management | 2009 | https://doi.org/10.1007/s11077-009-9103-5 | 2 |
| W2144768886 | The governance of sustainable socio-technical transitions | 2005 | https://doi.org/10.1016/j.respol.2005.07.005 | 2 |
| W2149155737 | Transforming governance and institutions for global sustainability: key insights from the Earth System Governance Project | 2012 | https://doi.org/10.1016/j.cosust.2012.01.014 | 2 |
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| W4220713469 | Unveiling uncertainties to enhance sustainability transformations in infrastructure decision-making | 2022 | https://doi.org/10.1016/j.cosust.2022.101172 | 2 |
| W4221021933 | How to swarm? Organizing for sustainable and equitable food systems transformation in a time of crisis | 2022 | https://doi.org/10.1016/j.gfs.2022.100629 | 2 |
| W4221028911 | Why the Great Food Transformation may not happen – A deep-dive into our food systems’ political economy, controversies and politics of evidence | 2022 | https://doi.org/10.1016/j.worlddev.2022.105881 | 2 |
| W4221029450 | National innovation systems and sustainability: What is the role of the environmental dimension? | 2022 | https://doi.org/10.1016/j.jclepro.2022.131164 | 2 |
| W4221059619 | Five Practices for Building Local Capacity in Sustainability-Driven Entrepreneurship for Place-Based Transformations | 2022 | https://doi.org/10.3390/su14053027 | 2 |
| W4221068901 | Engaging with the future: framings of adaptation to climate change in conservation | 2022 | https://doi.org/10.1080/26395916.2022.2043940 | 2 |
| W4221096131 | From managing transitions towards building movements of affect: Advancing agroecological practices and transformation in Brazil | 2022 | https://doi.org/10.1016/j.geoforum.2022.02.011 | 2 |
| W4226169891 | Governing for Transformative Change across the Biodiversity–Climate–Society Nexus | 2022 | https://doi.org/10.1093/biosci/biac031 | 2 |
| W4229374930 | Review of research into urban experimentation in the fields of sustainability transitions and environmental governance | 2022 | https://doi.org/10.1080/09654313.2022.2070424 | 2 |
| W4229441609 | Downscaling doughnut economics for sustainability governance | 2022 | https://doi.org/10.1016/j.cosust.2022.101180 | 2 |
| W4232249741 | Index | 2020 | https://doi.org/10.1017/9781108688277.017 | 2 |
| W4239975309 | Seeds of the Future in the Present | 2018 | https://doi.org/10.1017/9781316647554.018 | 2 |
| W4240193250 | Preface | 2018 | https://doi.org/10.1017/9781316647554.001 | 2 |
| W4245283308 | Index | 2019 | https://doi.org/10.1017/9781108766975.011 | 2 |
| W4281568170 | Enabling Transformative Biodiversity Governance in the Post-2020 Era | 2022 | https://doi.org/10.1017/9781108856348.017 | 2 |
| W4282828301 | When do disasters spark transformative policy change and why? | 2022 | https://doi.org/10.1332/030557321x16508834302815 | 2 |
| W4283363279 | Managing vulnerability in the Green Climate Fund | 2022 | https://doi.org/10.1080/17565529.2022.2081118 | 2 |
| W4283774529 | The human–technical–environmental systems framework for sustainability analysis | 2022 | https://doi.org/10.1007/s11625-022-01177-0 | 2 |
| W4285984322 | Archetypes of system transition and transformation: Six lessons for stewarding change | 2022 | https://doi.org/10.1016/j.erss.2022.102646 | 2 |
| W4288489135 | Transformational adaptation and country ownership: competing priorities in international adaptation finance | 2022 | https://doi.org/10.1080/14693062.2022.2104791 | 2 |
| W4291237335 | Values as leverage points for sustainability transformation: two pathways for transformation research | 2022 | https://doi.org/10.1016/j.cosust.2022.101205 | 2 |
| W4294132090 | Assessing biodiversity policy designs in Australia, France and Sweden. Comparative lessons for transformative governance of biodiversity? | 2022 | https://doi.org/10.1080/1523908x.2022.2117145 | 2 |
| W4294365732 | Transformative adaptation and implications for transdisciplinary climate change research | 2022 | https://doi.org/10.1088/2752-5295/ac8b9d | 2 |
| W4295895107 | Gender-transformative approaches in international development: A brief history and five uniting principles | 2022 | https://doi.org/10.1016/j.wsif.2022.102635 | 2 |
| W4297225318 | Are Citizens Ready for Active Climate Engagement or Stuck in a Game of Blame? Local Perceptions of Climate Action and Citizen Participation in Chilean Patagonia | 2022 | https://doi.org/10.3390/su141912034 | 2 |
| W4300104998 | Transitions to Sustainable Development | 2010 | https://doi.org/10.4324/9780203856598 | 2 |
| W4303474785 | Societal transformation through the prism of the concept of territoire: A French contribution | 2022 | https://doi.org/10.1016/j.eist.2022.10.001 | 2 |
| W4304822863 | Food systems transformations in South America: Insights from a transdisciplinary process rooted in Uruguay | 2022 | https://doi.org/10.3389/fsufs.2022.887034 | 2 |
| W4307224017 | Methodology Underpinning the State of Climate Action Series | 2022 | https://doi.org/10.46830/writn.22.00064 | 2 |
| W4308741572 | Towards a deeper understanding of up-scaling in socio-technical transitions: The case of energy communities | 2022 | https://doi.org/10.1016/j.erss.2022.102860 | 2 |
| W4309913737 | CONDITIONS OF THE GREEN TRANSFORMATION. THE CASE OF THE EUROPEAN UNION | 2022 | https://doi.org/10.3846/tede.2022.17993 | 2 |
| W4310004272 | Disruptive seeds: a scenario approach to explore power shifts in sustainability transformations | 2022 | https://doi.org/10.1007/s11625-022-01251-7 | 2 |
| W4311654161 | Transdisciplinary transformative change: An analysis of some best practices and barriers and the role of critical social science in getting us there | 2022 | https://doi.org/10.21203/rs.3.rs-2330434/v1 | 2 |
| W4312190462 | Explaining societal change through bricolage: Transformations in regimes of water governance | 2022 | https://doi.org/10.1177/25148486221143666 | 2 |
| W4312201874 | A Novel Framework for Inner-Outer Sustainability Assessment | 2022 | https://doi.org/10.3390/challe13020064 | 2 |
| W4313241558 | Gender in sustainability transition studies: Concepts, blind spots and future orientations | 2023 | https://doi.org/10.1016/j.eist.2022.100686 | 2 |
| W4313399531 | Food system transformation: Urban perspectives | 2023 | https://doi.org/10.1016/j.cities.2022.104164 | 2 |
| W4313461244 | The role of institutions in food system transformations: lessons learned from transdisciplinary engagements in Ethiopia, the Philippines, and Indonesia | 2022 | https://doi.org/10.1080/26395916.2022.2146753 | 2 |
| W4315783807 | Degrowth and agri-food systems: a research agenda for the critical social sciences | 2023 | https://doi.org/10.1007/s11625-022-01276-y | 2 |
| W4317814988 | From hegemony-reinforcing to hegemony-transcending transformations: horizons of possibility and strategies of escape | 2023 | https://doi.org/10.1007/s11625-022-01257-1 | 2 |
| W4319013622 | Measuring Transformational Impact of Cooperatives | 2023 | https://doi.org/10.1007/978-3-031-17403-2\_14 | 2 |
| W4319787226 | Greening recovery – Overcoming policy incoherence for sustainability transformations | 2023 | https://doi.org/10.1002/eet.2049 | 2 |
| W4320515164 | Transitions through the dynamics of adaptive cycles: Evolution of the Finnish agrifood system | 2023 | https://doi.org/10.1016/j.agsy.2023.103604 | 2 |
| W4321787171 | Visualizing Equitable Housing: A Prototype for a Framework | 2023 | https://doi.org/10.3390/su15054110 | 2 |
| W4322581595 | Navigating Local Pathways to Sustainability Through Environmental Stewardship: A Case Study in East Gippsland, Australia | 2023 | https://doi.org/10.1007/978-3-031-18268-6\_9 | 2 |
| W4323309951 | Setting-up place-based and transdisciplinary research to foster agrifood system transformation: Insights from the Aliment’Actions project in western France | 2023 | https://doi.org/10.3389/fsufs.2023.886353 | 2 |
| W4328110970 | Our common metrics? Our Common Agenda report and the epistemic infrastructure of the Sustainable Development Goals | 2023 | https://doi.org/10.1111/1758-5899.13176 | 2 |
| W4328120212 | Transdisciplinary transformative change: an analysis of some best practices and barriers, and the potential of critical social science in getting us there | 2023 | https://doi.org/10.1007/s10531-023-02576-0 | 2 |
| W4360859671 | Collaborative water management through revitalizing social power relationships: a social network analysis of Qanat stakeholders in Iran | 2023 | https://doi.org/10.1007/s00271-023-00856-9 | 2 |
| W4362660655 | Exploring visions and vision clusters of sustainable food packaging - The case of Finland | 2023 | https://doi.org/10.1016/j.futures.2023.103157 | 2 |
| W4367307370 | Generating transformative capacity: ICLEI Africa’s urban natural assets for Africa programme | 2023 | https://doi.org/10.1080/13549839.2023.2190349 | 2 |
| W4367599260 | A genealogy of sustainable agriculture narratives: implications for the transformative potential of regenerative agriculture | 2023 | https://doi.org/10.1007/s10460-023-10444-4 | 2 |
| W4376115229 | Unlocking Lethal Dingo Management in Australia | 2023 | https://doi.org/10.3390/d15050642 | 2 |
| W4376566994 | Building pathways between transdisciplinarity and transformation: Lessons from practice | 2023 | https://doi.org/10.14512/gaia.32.1.10 | 2 |
| W4381432119 | Place-based solutions for global social-ecological dilemmas: An analysis of locally grounded, diversified, and cross-scalar initiatives in the Amazon | 2023 | https://doi.org/10.1016/j.gloenvcha.2023.102718 | 2 |
| W4381930659 | Socio-technical transitions and sustainable agriculture in Latin America and the Caribbean: a systematic review of the literature 2010–2021 | 2023 | https://doi.org/10.3389/fsufs.2023.1145263 | 2 |
| W4382133137 | How to achieve the net-zero target? Lessons learned from past transformations | 2023 | https://doi.org/10.1371/journal.pstr.0000068 | 2 |
| W4382623225 | Politics beyond agency? Pluralizing structure(s) in sustainability transitions | 2023 | https://doi.org/10.1016/j.erss.2023.103120 | 2 |
| W4384130040 | The role of disasters in shaping narratives of resilience and transformation in Puerto Rico | 2023 | https://doi.org/10.1016/j.crsust.2023.100227 | 2 |
| W4384558028 | How Do Unsustainable Practices Remain Dominant? A Practice Theory Reinterpretation of Gramsci | 2023 | https://doi.org/10.1177/00380385231178643 | 2 |
| W4384819983 | The liberal limits to transformation in the Green Climate Fund | 2023 | https://doi.org/10.1080/17565529.2023.2235318 | 2 |
| W4385322577 | Dialogic data innovations for sustainability transformations and flood resilience: The case for waterproofing data | 2023 | https://doi.org/10.1016/j.gloenvcha.2023.102730 | 2 |

### 2.1.5 Identification of Concepts

OpenAlex assigns all works concepts. The concepts are in hirarchical order, ranging from 0 to 3. The higher the number, the more specific the concept. The concepts are assigned to the paper (id)

#### 2.1.5.1 Level 0

x <- lapply(  
 flat\_snow[["concepts"]],  
 FUN = function(x) {  
 x[["display\_name"]][x[["level"]] == 0]  
 }  
) |>  
 unlist() |>  
 table() |>  
 as.data.frame() |>   
 rename(  
 l1\_concept = Var1,  
 count = Freq  
 ) |>  
 arrange(desc(count))  
  
writexl::write\_xlsx(x, file.path(".", "data", "concepts\_l0.xlsx"))  
  
knitr::kable(x)

| l1\_concept | count |
| --- | --- |
| Political science | 1136 |
| Biology | 1110 |
| Sociology | 917 |
| Economics | 914 |
| Business | 822 |
| Computer science | 787 |
| Geography | 601 |
| Philosophy | 523 |
| Engineering | 444 |
| Physics | 340 |
| Psychology | 279 |
| Environmental science | 217 |
| Chemistry | 202 |
| Mathematics | 175 |
| Medicine | 117 |
| Art | 39 |
| Geology | 39 |
| History | 30 |
| Materials science | 9 |

#### 2.1.5.2 Level 1

x <- lapply(  
 flat\_snow[["concepts"]],  
 function(x) {  
 x[["display\_name"]][x[["level"]] == 1]  
 }  
) |>  
 unlist() |>  
 table() |>  
 as.data.frame() |>   
 rename(  
 l1\_concept = Var1,  
 count = Freq  
 ) |>  
 arrange(desc(count))  
   
writexl::write\_xlsx(x, file.path(".", "data", "concepts\_l1.xlsx"))  
  
knitr::kable(x)

| l1\_concept | count |
| --- | --- |
| Ecology | 1048 |
| Law | 832 |
| Environmental resource management | 480 |
| Finance | 375 |
| Social science | 360 |
| Pedagogy | 346 |
| Archaeology | 332 |
| Environmental planning | 325 |
| Public relations | 295 |
| Environmental ethics | 241 |
| Economic system | 234 |
| Epistemology | 227 |
| Artificial intelligence | 220 |
| Biochemistry | 219 |
| Quantum mechanics | 212 |
| Management | 199 |
| Knowledge management | 195 |
| Management science | 160 |
| Linguistics | 147 |
| Operating system | 146 |
| Process management | 145 |
| Economic growth | 136 |
| Engineering ethics | 134 |
| Environmental economics | 130 |
| Neuroscience | 109 |
| Social psychology | 108 |
| Programming language | 103 |
| Political economy | 102 |
| Marketing | 98 |
| Natural resource economics | 97 |
| Public administration | 91 |
| Pathology | 90 |
| Anthropology | 89 |
| Economic geography | 84 |
| Thermodynamics | 81 |
| Machine learning | 77 |
| Computer security | 75 |
| Mathematical analysis | 75 |
| Industrial organization | 72 |
| Paleontology | 70 |
| Risk analysis (engineering) | 69 |
| Electrical engineering | 61 |
| Mechanical engineering | 60 |
| Civil engineering | 56 |
| Regional science | 56 |
| World Wide Web | 56 |
| Psychotherapist | 52 |
| Cartography | 51 |
| Microeconomics | 44 |
| Psychiatry | 43 |
| Macroeconomics | 42 |
| Market economy | 41 |
| Pure mathematics | 39 |
| Computer network | 38 |
| Statistics | 38 |
| Algorithm | 33 |
| Demography | 33 |
| Economy | 33 |
| Public economics | 33 |
| Optics | 32 |
| Oceanography | 30 |
| Embedded system | 27 |
| Positive economics | 26 |
| Structural engineering | 25 |
| Waste management | 25 |
| Development economics | 22 |
| Law and economics | 22 |
| Evolutionary biology | 21 |
| Financial economics | 20 |
| Data science | 19 |
| Geometry | 19 |
| Aesthetics | 17 |
| Geodesy | 17 |
| Neoclassical economics | 17 |
| Botany | 16 |
| Database | 16 |
| Visual arts | 16 |
| Agroforestry | 15 |
| Literature | 15 |
| Meteorology | 15 |
| Software engineering | 15 |
| Advertising | 14 |
| Humanities | 13 |
| Environmental engineering | 12 |
| International trade | 12 |
| Nursing | 12 |
| Communication | 11 |
| Physical geography | 11 |
| Telecommunications | 11 |
| Theology | 11 |
| Gender studies | 10 |
| Library science | 10 |
| Data mining | 9 |
| Fishery | 9 |
| Forestry | 9 |
| Genetics | 9 |
| Internet privacy | 9 |
| Organic chemistry | 9 |
| Systems engineering | 9 |
| Water resource management | 9 |
| Acoustics | 8 |
| Architectural engineering | 8 |
| Agricultural economics | 7 |
| Astronomy | 7 |
| Climatology | 7 |
| Developmental psychology | 7 |
| Operations management | 7 |
| Socioeconomics | 7 |
| Accounting | 6 |
| Astrobiology | 6 |
| Cognitive science | 6 |
| Combinatorics | 6 |
| Internal medicine | 6 |
| Media studies | 6 |
| Aerospace engineering | 5 |
| Chromatography | 5 |
| Composite material | 5 |
| Econometrics | 5 |
| Environmental protection | 5 |
| Mathematical economics | 5 |
| Petroleum engineering | 5 |
| Transport engineering | 5 |
| Agricultural science | 4 |
| Art history | 4 |
| Clinical psychology | 4 |
| Earth science | 4 |
| Engineering management | 4 |
| Mathematical physics | 4 |
| Reliability engineering | 4 |
| Agronomy | 3 |
| Applied psychology | 3 |
| Astrophysics | 3 |
| Cognitive psychology | 3 |
| Food science | 3 |
| Information retrieval | 3 |
| Operations research | 3 |
| Ophthalmology | 3 |
| Physical chemistry | 3 |
| Soil science | 3 |
| Virology | 3 |
| Biotechnology | 2 |
| Classical mechanics | 2 |
| Commerce | 2 |
| Computer vision | 2 |
| Demographic economics | 2 |
| Economic policy | 2 |
| Engineering physics | 2 |
| Environmental health | 2 |
| Financial system | 2 |
| Geomorphology | 2 |
| Geotechnical engineering | 2 |
| Gynecology | 2 |
| Immunology | 2 |
| Medical education | 2 |
| Microbiology | 2 |
| Multimedia | 2 |
| Polymer chemistry | 2 |
| Atmospheric sciences | 1 |
| Biochemical engineering | 1 |
| Cell biology | 1 |
| Chemical engineering | 1 |
| Condensed matter physics | 1 |
| Economic history | 1 |
| Endocrinology | 1 |
| Ethnology | 1 |
| Forensic engineering | 1 |
| Human–computer interaction | 1 |
| International economics | 1 |
| Keynesian economics | 1 |
| Labour economics | 1 |
| Mathematics education | 1 |
| Molecular biology | 1 |
| Nanotechnology | 1 |
| Natural language processing | 1 |
| Nuclear engineering | 1 |
| Nuclear physics | 1 |
| Parallel computing | 1 |
| Psychoanalysis | 1 |
| Radiology | 1 |
| Remote sensing | 1 |
| Theoretical computer science | 1 |
| Welfare economics | 1 |

#### 2.1.5.3 Level 2

x <- lapply(  
 flat\_snow[["concepts"]],  
 function(x) {  
 x[["display\_name"]][x[["level"]] == 2]  
 }  
) |>  
 unlist() |>  
 table() |>  
 as.data.frame() |>   
 rename(  
 l2\_concept = Var1,  
 count = Freq  
 ) |>  
 arrange(desc(count))  
   
writexl::write\_xlsx(x, file.path(".", "data", "concepts\_l2.xlsx"))  
  
knitr::kable(x)

| l2\_concept | count |
| --- | --- |
| Sustainability | 690 |
| Corporate governance | 391 |
| Politics | 375 |
| Transformative learning | 321 |
| Climate change | 247 |
| Sustainable development | 227 |
| Context (archaeology) | 214 |
| Gene | 209 |
| Agriculture | 157 |
| Action (physics) | 128 |
| Adaptation (eye) | 116 |
| Process (computing) | 112 |
| Agency (philosophy) | 110 |
| Perspective (graphical) | 90 |
| Resilience (materials science) | 81 |
| Transformational leadership | 81 |
| Government (linguistics) | 77 |
| Psychological resilience | 76 |
| Alternative medicine | 66 |
| Futures contract | 64 |
| Scale (ratio) | 59 |
| Stakeholder | 59 |
| Framing (construction) | 54 |
| Scholarship | 54 |
| Normative | 51 |
| Content (measure theory) | 50 |
| Citizen journalism | 49 |
| Order (exchange) | 49 |
| Reflexivity | 46 |
| Power (physics) | 45 |
| Vulnerability (computing) | 45 |
| Anthropocene | 42 |
| Renewable energy | 42 |
| Ecosystem | 41 |
| Urban planning | 41 |
| Work (physics) | 41 |
| Vision | 38 |
| Conceptual framework | 37 |
| Earth system science | 37 |
| Leverage (statistics) | 37 |
| Sociotechnical system | 37 |
| Circular economy | 36 |
| Value (mathematics) | 34 |
| Mainstream | 33 |
| Population | 33 |
| Energy (signal processing) | 32 |
| Biodiversity | 31 |
| Production (economics) | 31 |
| Scope (computer science) | 31 |
| Variety (cybernetics) | 31 |
| Psychological intervention | 30 |
| Set (abstract data type) | 30 |
| Diversity (politics) | 28 |
| Economic Justice | 28 |
| Field (mathematics) | 28 |
| Narrative | 28 |
| State (computer science) | 28 |
| Transformation processes | 26 |
| China | 25 |
| Empirical research | 25 |
| Incentive | 25 |
| Negotiation | 25 |
| Resource (disambiguation) | 25 |
| Niche | 23 |
| Social change | 23 |
| Qualitative research | 22 |
| Typology | 22 |
| Accountability | 21 |
| Ecological systems theory | 21 |
| Indigenous | 21 |
| Operationalization | 21 |
| Business model | 20 |
| Disease | 20 |
| Empowerment | 20 |
| Equity (law) | 20 |
| Greenhouse gas | 20 |
| Interdependence | 20 |
| Status quo | 20 |
| Transdisciplinarity | 20 |
| Urbanization | 20 |
| Discipline | 19 |
| Key (lock) | 19 |
| Intermediary | 18 |
| Natural resource | 18 |
| Nexus (standard) | 18 |
| Quality (philosophy) | 18 |
| Function (biology) | 17 |
| Relevance (law) | 17 |
| Conceptualization | 16 |
| Dynamics (music) | 16 |
| Habitat | 16 |
| Tourism | 16 |
| Consumption (sociology) | 15 |
| Meaning (existential) | 15 |
| Pace | 15 |
| Technological change | 15 |
| Cognitive reframing | 14 |
| Electricity | 14 |
| Land use | 14 |
| Space (punctuation) | 14 |
| Stakeholder engagement | 14 |
| Dimension (graph theory) | 13 |
| Face (sociological concept) | 13 |
| Futures studies | 13 |
| Identity (music) | 13 |
| Paradigm shift | 13 |
| Adaptive management | 12 |
| Metropolitan area | 12 |
| Restructuring | 12 |
| Social learning | 12 |
| Bridging (networking) | 11 |
| German | 11 |
| Perception | 11 |
| Relation (database) | 11 |
| Scarcity | 11 |
| Situated | 11 |
| Systems thinking | 11 |
| Transparency (behavior) | 11 |
| Argument (complex analysis) | 10 |
| Embeddedness | 10 |
| General partnership | 10 |
| Livestock | 10 |
| Resistance (ecology) | 10 |
| Social capital | 10 |
| Software deployment | 10 |
| Term (time) | 10 |
| Architecture | 9 |
| CLARITY | 9 |
| Commons | 9 |
| Complex adaptive system | 9 |
| Entrepreneurship | 9 |
| Focus group | 9 |
| Identification (biology) | 9 |
| Index (typography) | 9 |
| Innovation system | 9 |
| Living lab | 9 |
| MEDLINE | 9 |
| Natural (archaeology) | 9 |
| Risk management | 9 |
| Supply chain | 9 |
| System dynamics | 9 |
| Tipping point (physics) | 9 |
| Unintended consequences | 9 |
| Viewpoints | 9 |
| Anticipation (artificial intelligence) | 8 |
| Citizen science | 8 |
| Control reconfiguration | 8 |
| European union | 8 |
| Flexibility (engineering) | 8 |
| Fossil fuel | 8 |
| Multidisciplinary approach | 8 |
| Private sector | 8 |
| Unpacking | 8 |
| Adaptability | 7 |
| Ambiguity | 7 |
| Credibility | 7 |
| Developing country | 7 |
| Disaster risk reduction | 7 |
| Environmental justice | 7 |
| Flood myth | 7 |
| Globe | 7 |
| Health care | 7 |
| Humanity | 7 |
| Institutional change | 7 |
| Legislature | 7 |
| Local government | 7 |
| Plural | 7 |
| Position (finance) | 7 |
| Poverty | 7 |
| Special education | 7 |
| Structure and agency | 7 |
| Underpinning | 7 |
| Action research | 6 |
| Autonomy | 6 |
| Bibliometrics | 6 |
| Competition (biology) | 6 |
| Construct (python library) | 6 |
| Development (topology) | 6 |
| Diversification (marketing strategy) | 6 |
| Experiential learning | 6 |
| Green infrastructure | 6 |
| Higher education | 6 |
| Human settlement | 6 |
| Intermediation | 6 |
| Intervention (counseling) | 6 |
| Lagging | 6 |
| Latin Americans | 6 |
| Legislation | 6 |
| Lens (geology) | 6 |
| Modernization theory | 6 |
| Novelty | 6 |
| Participatory action research | 6 |
| Premise | 6 |
| Prosperity | 6 |
| Public health | 6 |
| Service (business) | 6 |
| Social media | 6 |
| Sociocultural evolution | 6 |
| Spatial planning | 6 |
| Structuring | 6 |
| Water resources | 6 |
| Amazon rainforest | 5 |
| Anthropocentrism | 5 |
| Biosphere | 5 |
| Capacity building | 5 |
| Clothing | 5 |
| Competitive advantage | 5 |
| Coproduction | 5 |
| Corporate social responsibility | 5 |
| Deforestation (computer science) | 5 |
| Destabilisation | 5 |
| Distribution (mathematics) | 5 |
| Efficient energy use | 5 |
| Element (criminal law) | 5 |
| Emerging technologies | 5 |
| Empirical evidence | 5 |
| Environmental policy | 5 |
| Exploratory research | 5 |
| Financial crisis | 5 |
| Fishing | 5 |
| Focus (optics) | 5 |
| Formative assessment | 5 |
| Heuristic | 5 |
| Institutionalisation | 5 |
| Interpretation (philosophy) | 5 |
| Knowledge production | 5 |
| Maladaptation | 5 |
| Openness to experience | 5 |
| Payment | 5 |
| Pluralism (philosophy) | 5 |
| Policy analysis | 5 |
| Popularity | 5 |
| Public policy | 5 |
| Resource efficiency | 5 |
| Sample (material) | 5 |
| Sanitation | 5 |
| Scenario planning | 5 |
| Scrutiny | 5 |
| Social system | 5 |
| Sociology of scientific knowledge | 5 |
| Stock (firearms) | 5 |
| Strengths and weaknesses | 5 |
| Summit | 5 |
| The arts | 5 |
| Theory of change | 5 |
| Water supply | 5 |
| Action plan | 4 |
| Biofuel | 4 |
| Blueprint | 4 |
| Boundary (topology) | 4 |
| Capital (architecture) | 4 |
| Centrality | 4 |
| Citation | 4 |
| Composite number | 4 |
| Conflict transformation | 4 |
| CONTEST | 4 |
| Conversation | 4 |
| Coping (psychology) | 4 |
| Creativity | 4 |
| Dependability | 4 |
| Desk | 4 |
| Earth (classical element) | 4 |
| Energy consumption | 4 |
| Environmental impact assessment | 4 |
| Environmental law | 4 |
| Extant taxon | 4 |
| Food waste | 4 |
| Globalization | 4 |
| Greening | 4 |
| Hazard | 4 |
| Human systems engineering | 4 |
| Injustice | 4 |
| Institutional theory | 4 |
| Intersectionality | 4 |
| Leadership style | 4 |
| Materialism | 4 |
| Mindset | 4 |
| Modernity | 4 |
| Natural hazard | 4 |
| Nature versus nurture | 4 |
| Neutrality | 4 |
| Parallels | 4 |
| Path dependence | 4 |
| Performative utterance | 4 |
| Phenomenon | 4 |
| Praxis | 4 |
| Product (mathematics) | 4 |
| Realm | 4 |
| Reputation | 4 |
| Social dynamics | 4 |
| Strategic planning | 4 |
| Treaty | 4 |
| Wicked problem | 4 |
| Acknowledgement | 3 |
| Agile software development | 3 |
| Appeal | 3 |
| Appropriation | 3 |
| Best practice | 3 |
| Big data | 3 |
| Business ethics | 3 |
| Certification | 3 |
| Character (mathematics) | 3 |
| Co-creation | 3 |
| Coherence (philosophical gambling strategy) | 3 |
| Competence (human resources) | 3 |
| Conceptual model | 3 |
| Control (management) | 3 |
| Damages | 3 |
| Dependency (UML) | 3 |
| Dialectic | 3 |
| Disadvantaged | 3 |
| Dual (grammatical number) | 3 |
| Embodied cognition | 3 |
| Emerging markets | 3 |
| Environmental stewardship | 3 |
| Evolutionary economics | 3 |
| Exploit | 3 |
| Financial intermediary | 3 |
| Flourishing | 3 |
| Food packaging | 3 |
| Food processing | 3 |
| Foregrounding | 3 |
| Fragmentation (computing) | 3 |
| Frame (networking) | 3 |
| GRASP | 3 |
| Grazing | 3 |
| Heuristics | 3 |
| Inclusion (mineral) | 3 |
| Indonesian | 3 |
| Industrial Revolution | 3 |
| Industrialisation | 3 |
| Interdisciplinarity | 3 |
| Interim | 3 |
| Internet of Things | 3 |
| Interpersonal communication | 3 |
| Interpersonal ties | 3 |
| Knowledge base | 3 |
| Lean manufacturing | 3 |
| Literacy | 3 |
| Logit | 3 |
| Macro | 3 |
| Mediation | 3 |
| Outbreak | 3 |
| Path (computing) | 3 |
| Phase (matter) | 3 |
| Plan (archaeology) | 3 |
| Planet | 3 |
| Portfolio | 3 |
| Portuguese | 3 |
| Pragmatism | 3 |
| Procurement | 3 |
| Productivity | 3 |
| Profit (economics) | 3 |
| Public engagement | 3 |
| Public transport | 3 |
| Qualitative property | 3 |
| Ranking (information retrieval) | 3 |
| Rationality | 3 |
| Reading (process) | 3 |
| Reciprocity (cultural anthropology) | 3 |
| Recreation | 3 |
| Reductionism | 3 |
| Redundancy (engineering) | 3 |
| Safeguarding | 3 |
| Salience (neuroscience) | 3 |
| Salient | 3 |
| Scaling | 3 |
| Selection (genetic algorithm) | 3 |
| Social responsibility | 3 |
| Software | 3 |
| Stressor | 3 |
| Structural equation modeling | 3 |
| Subsidy | 3 |
| Surface runoff | 3 |
| Temporality | 3 |
| Test (biology) | 3 |
| Theme (computing) | 3 |
| Thriving | 3 |
| Timeline | 3 |
| Tragedy (event) | 3 |
| Virtue | 3 |
| Watershed | 3 |
| Wetland | 3 |
| Wildlife | 3 |
| Workforce | 3 |
| Affect (linguistics) | 2 |
| Air quality index | 2 |
| Alliance | 2 |
| Aotearoa | 2 |
| Archetype | 2 |
| Baltic sea | 2 |
| Branching (polymer chemistry) | 2 |
| Bricolage | 2 |
| Business ecosystem | 2 |
| Capability approach | 2 |
| Catalysis | 2 |
| Clean energy | 2 |
| Cloud computing | 2 |
| Coal | 2 |
| Coevolution | 2 |
| Cognition | 2 |
| Cohesion (chemistry) | 2 |
| Commodification | 2 |
| Common ground | 2 |
| Community engagement | 2 |
| Comparative advantage | 2 |
| Comparative case | 2 |
| Compass | 2 |
| Component (thermodynamics) | 2 |
| Consciousness | 2 |
| Conservation biology | 2 |
| Consistency (knowledge bases) | 2 |
| Consolidation (business) | 2 |
| Consumerism | 2 |
| Content analysis | 2 |
| Convention | 2 |
| Coral | 2 |
| Coral reef | 2 |
| Craft | 2 |
| Critical theory | 2 |
| Curriculum | 2 |
| Cybernetics | 2 |
| Dance | 2 |
| Decentralization | 2 |
| Declaration | 2 |
| Delphi method | 2 |
| Demand side | 2 |
| Demographics | 2 |
| Dichotomy | 2 |
| Dignity | 2 |
| Dilemma | 2 |
| Directive | 2 |
| Disconnection | 2 |
| Divergence (linguistics) | 2 |
| Documentation | 2 |
| Dystopia | 2 |
| Ecological psychology | 2 |
| Enabling | 2 |
| Enforcement | 2 |
| Engineering design process | 2 |
| Environmental crisis | 2 |
| Environmental education | 2 |
| Environmental quality | 2 |
| Everyday life | 2 |
| Excellence | 2 |
| Explanatory power | 2 |
| Externality | 2 |
| Facilitation | 2 |
| Financialization | 2 |
| Fish | 2 |
| Flemish | 2 |
| Frontier | 2 |
| Gold mining | 2 |
| Green innovation | 2 |
| Grid | 2 |
| Hierarchy | 2 |
| Honor | 2 |
| Human capital | 2 |
| Human evolution | 2 |
| Human geography | 2 |
| Hydropower | 2 |
| Ideal (ethics) | 2 |
| Idealism | 2 |
| Ignorance | 2 |
| Image (mathematics) | 2 |
| Impact assessment | 2 |
| Industrial policy | 2 |
| Industrial society | 2 |
| Inequality | 2 |
| Information and Communications Technology | 2 |
| Ingenuity | 2 |
| Institutional economics | 2 |
| Intellectual property | 2 |
| Irrigation | 2 |
| Knowledge engineering | 2 |
| Language change | 2 |
| Leapfrogging | 2 |
| Liberalization | 2 |
| Local community | 2 |
| Malaria | 2 |
| Management system | 2 |
| Marketing management | 2 |
| Materiality (auditing) | 2 |
| Measure (data warehouse) | 2 |
| Metaphor | 2 |
| Modal | 2 |
| Modalities | 2 |
| Multitude | 2 |
| Musical | 2 |
| Neglect | 2 |
| Neighbourhood (mathematics) | 2 |
| Neoliberalism (international relations) | 2 |
| Newspaper | 2 |
| Niche construction | 2 |
| Norm (philosophy) | 2 |
| Norwegian | 2 |
| Objectivity (philosophy) | 2 |
| Ocean observations | 2 |
| Outcome (game theory) | 2 |
| Outreach | 2 |
| Participatory planning | 2 |
| Peasant | 2 |
| Peninsula | 2 |
| Performance art | 2 |
| Plea | 2 |
| Policy Sciences | 2 |
| Pollution | 2 |
| Port (circuit theory) | 2 |
| Practice theory | 2 |
| Preparedness | 2 |
| Prioritization | 2 |
| Privilege (computing) | 2 |
| Profitability index | 2 |
| Project management | 2 |
| Provisioning | 2 |
| Psychometrics | 2 |
| Psychosocial | 2 |
| Public good | 2 |
| Public interest | 2 |
| Public participation | 2 |
| Rangeland | 2 |
| Reef | 2 |
| Refugee | 2 |
| Reinterpretation | 2 |
| Reproduction | 2 |
| Restoration ecology | 2 |
| Revenue | 2 |
| Rhetoric | 2 |
| Rhetorical question | 2 |
| Rigour | 2 |
| Science education | 2 |
| Science policy | 2 |
| Section (typography) | 2 |
| Servant | 2 |
| Shock (circulatory) | 2 |
| Sky | 2 |
| Social group | 2 |
| Social innovation | 2 |
| Social justice | 2 |
| Social theory | 2 |
| Socioeconomic development | 2 |
| Soil water | 2 |
| Spatial heterogeneity | 2 |
| Strategic management | 2 |
| Subject (documents) | 2 |
| Subjectivity | 2 |
| Surprise | 2 |
| Systems theory | 2 |
| Tanzania | 2 |
| Task (project management) | 2 |
| Technology policy | 2 |
| Temporalities | 2 |
| Terminology | 2 |
| The Imaginary | 2 |
| The Renaissance | 2 |
| Trap (plumbing) | 2 |
| TRIPS architecture | 2 |
| Utopia | 2 |
| Water quality | 2 |
| Welfare | 2 |
| Wind power | 2 |
| Wine | 2 |
| Witness | 2 |
| Work in process | 2 |
| Absorptive capacity | 1 |
| Abstraction | 1 |
| Acceleration | 1 |
| Access to finance | 1 |
| Agent-based model | 1 |
| Ambivalence | 1 |
| Analogy | 1 |
| Analytic hierarchy process | 1 |
| Anger | 1 |
| Antibiotics | 1 |
| Applied ethics | 1 |
| Archipelago | 1 |
| Arctic | 1 |
| Argumentation theory | 1 |
| Artificial neural network | 1 |
| Asia pacific | 1 |
| Assemblage (archaeology) | 1 |
| Asset (computer security) | 1 |
| Attractor | 1 |
| Audit | 1 |
| Autoethnography | 1 |
| Automotive industry | 1 |
| Aviation | 1 |
| Balanced scorecard | 1 |
| Baseline (sea) | 1 |
| Basic income | 1 |
| Bathing | 1 |
| Behavior change | 1 |
| Bespoke | 1 |
| Biobank | 1 |
| Biodegradable plastic | 1 |
| Biogas | 1 |
| Biologist | 1 |
| Biomass (ecology) | 1 |
| Bivariate analysis | 1 |
| Blame | 1 |
| Blank | 1 |
| Block (permutation group theory) | 1 |
| Blockchain | 1 |
| Boundary-work | 1 |
| Bounded function | 1 |
| Bounded rationality | 1 |
| Branching process | 1 |
| Bridge (graph theory) | 1 |
| Buddhism | 1 |
| Business case | 1 |
| Business risks | 1 |
| Business system planning | 1 |
| Butterfly | 1 |
| Cape | 1 |
| Car sharing | 1 |
| Carbon dioxide | 1 |
| Cardinal point | 1 |
| Causal model | 1 |
| Causality (physics) | 1 |
| Ceiling (cloud) | 1 |
| Champion | 1 |
| Chaotic | 1 |
| Chart | 1 |
| Chemical industry | 1 |
| Christian ministry | 1 |
| Civilization | 1 |
| Classifier (UML) | 1 |
| Clean technology | 1 |
| Closing (real estate) | 1 |
| Coastal management | 1 |
| Coastal zone | 1 |
| Coding (social sciences) | 1 |
| Collaborative learning | 1 |
| Collective efficacy | 1 |
| Colonialism | 1 |
| Commercialism | 1 |
| Commodity | 1 |
| Community organization | 1 |
| Community participation | 1 |
| Comparability | 1 |
| Complex system | 1 |
| Complexity management | 1 |
| Compliance (psychology) | 1 |
| Compromise | 1 |
| Computable general equilibrium | 1 |
| Conflation | 1 |
| Conflict resolution | 1 |
| Consciousness raising | 1 |
| Consequentialism | 1 |
| Constellation | 1 |
| Constitution | 1 |
| Construal level theory | 1 |
| Consumer behaviour | 1 |
| Contradiction | 1 |
| Conurbation | 1 |
| Copernicus | 1 |
| Core (optical fiber) | 1 |
| Cosmetics | 1 |
| Creative destruction | 1 |
| Crisis management | 1 |
| Crisis response | 1 |
| Critical infrastructure | 1 |
| Critical reflection | 1 |
| Criticism | 1 |
| Crop protection | 1 |
| Cross disciplinary | 1 |
| Cultural psychology | 1 |
| Cultural values | 1 |
| Curiosity | 1 |
| Current (fluid) | 1 |
| Data collection | 1 |
| Data envelopment analysis | 1 |
| Data-driven | 1 |
| Debt | 1 |
| Decision tree | 1 |
| Deconstruction (building) | 1 |
| Deep learning | 1 |
| Deep time | 1 |
| Deliverable | 1 |
| Demand management | 1 |
| Denial | 1 |
| Deontological ethics | 1 |
| Descriptive statistics | 1 |
| Desegregation | 1 |
| Design thinking | 1 |
| Dialog box | 1 |
| Dialogical self | 1 |
| Diffusion | 1 |
| Digital content | 1 |
| Digital transformation | 1 |
| Disaster research | 1 |
| Discrete choice | 1 |
| Disruptive innovation | 1 |
| Distance decay | 1 |
| Divestment | 1 |
| Division of labour | 1 |
| Domain (mathematical analysis) | 1 |
| Domestic market | 1 |
| Domestication | 1 |
| Download | 1 |
| Downstream (manufacturing) | 1 |
| DPSIR | 1 |
| Drone | 1 |
| Dual purpose | 1 |
| Duration (music) | 1 |
| Dynamic capabilities | 1 |
| Dynamism | 1 |
| E-commerce | 1 |
| Ecological crisis | 1 |
| Ecological efficiency | 1 |
| Ecological engineering | 1 |
| Economic recovery | 1 |
| Economic rent | 1 |
| Educational technology | 1 |
| Electronic waste | 1 |
| Emergency management | 1 |
| Emic and etic | 1 |
| Energy conservation | 1 |
| Energy demand | 1 |
| Energy sector | 1 |
| Environmental degradation | 1 |
| Environmental pollution | 1 |
| Environmental restoration | 1 |
| Environmental security | 1 |
| Environmental sociology | 1 |
| Environmentally friendly | 1 |
| Enzyme | 1 |
| Episteme | 1 |
| Estonian | 1 |
| Ethics of care | 1 |
| Ethnic group | 1 |
| Ethos | 1 |
| European region | 1 |
| Event (particle physics) | 1 |
| Evolutionary psychology | 1 |
| Evolutionary theory | 1 |
| Experiential knowledge | 1 |
| Explanatory model | 1 |
| Explication | 1 |
| Exposition (narrative) | 1 |
| Expression (computer science) | 1 |
| Expropriation | 1 |
| Extended producer responsibility | 1 |
| Extension (predicate logic) | 1 |
| Extinction (optical mineralogy) | 1 |
| Facilitator | 1 |
| Factor market | 1 |
| Factory (object-oriented programming) | 1 |
| Fantasy | 1 |
| Feeling | 1 |
| Fidelity | 1 |
| Financial market | 1 |
| Floodplain | 1 |
| Flowchart | 1 |
| Food chain | 1 |
| Food safety | 1 |
| Foreign direct investment | 1 |
| Forest management | 1 |
| Foundation (evidence) | 1 |
| Fragility | 1 |
| Frugality | 1 |
| Fuel cells | 1 |
| Fuzzy logic | 1 |
| Game design | 1 |
| Game mechanics | 1 |
| General assembly | 1 |
| Generative grammar | 1 |
| Genetic testing | 1 |
| Geospatial analysis | 1 |
| Germination | 1 |
| Glacier | 1 |
| Glass ceiling | 1 |
| Global network | 1 |
| Glyphosate | 1 |
| Goods and services | 1 |
| Graph | 1 |
| Grassland | 1 |
| Great Rift | 1 |
| Green marketing | 1 |
| Gross domestic product | 1 |
| Groundwater | 1 |
| Harm | 1 |
| Harmony (color) | 1 |
| Heading (navigation) | 1 |
| Heat stress | 1 |
| Hermeneutics | 1 |
| Holistic management | 1 |
| Homo sapiens | 1 |
| Homophily | 1 |
| Horizontal and vertical | 1 |
| Horse | 1 |
| Human development (humanity) | 1 |
| Human resources | 1 |
| Human rights | 1 |
| Human security | 1 |
| Human sexuality | 1 |
| Human values | 1 |
| Hygiene | 1 |
| Hyperparameter | 1 |
| Ideal type | 1 |
| Immediacy | 1 |
| Impact factor | 1 |
| Implementation | 1 |
| Impossibility | 1 |
| Impulse (physics) | 1 |
| Indigenization | 1 |
| Individual mobility | 1 |
| Individualism | 1 |
| Industrial and production engineering | 1 |
| Inertia | 1 |
| Inference | 1 |
| Inflection point | 1 |
| Informal sector | 1 |
| Informal settlements | 1 |
| Information ethics | 1 |
| Information exchange | 1 |
| Information flow | 1 |
| Information technology | 1 |
| Innovation diffusion | 1 |
| Innovation management | 1 |
| Institution | 1 |
| Institutional logic | 1 |
| Integrated pest management | 1 |
| Interconnectivity | 1 |
| Intercropping | 1 |
| International Action | 1 |
| International development | 1 |
| Intersection (aeronautics) | 1 |
| Isolation (microbiology) | 1 |
| Jargon | 1 |
| Journalism | 1 |
| Judgement | 1 |
| Kingdom | 1 |
| Knowledge transfer | 1 |
| Knowledge-based systems | 1 |
| Kuznets curve | 1 |
| Lead (geology) | 1 |
| Leadership development | 1 |
| Legal research | 1 |
| Life course approach | 1 |
| Life satisfaction | 1 |
| Lift (data mining) | 1 |
| Limit (mathematics) | 1 |
| Linear discriminant analysis | 1 |
| Linearity | 1 |
| Link (geometry) | 1 |
| Listing (finance) | 1 |
| Lithium (medication) | 1 |
| Living systems | 1 |
| Local Development | 1 |
| Lock (firearm) | 1 |
| Looming | 1 |
| Loss and damage | 1 |
| Mandate | 1 |
| Mangrove | 1 |
| Marine conservation | 1 |
| Marine spatial planning | 1 |
| Matching (statistics) | 1 |
| Material flow | 1 |
| Material flow analysis | 1 |
| Maturity (psychological) | 1 |
| Maya | 1 |
| Medical equipment | 1 |
| Mega- | 1 |
| Megacity | 1 |
| Membrane | 1 |
| Mental health | 1 |
| Mental model | 1 |
| Merge (version control) | 1 |
| Mesoamerica | 1 |
| Mesopotamia | 1 |
| Methodological individualism | 1 |
| Metric (unit) | 1 |
| Miami | 1 |
| Microfoundations | 1 |
| Miller | 1 |
| Mindfulness | 1 |
| Mode (computer interface) | 1 |
| Modular design | 1 |
| Monitoring and evaluation | 1 |
| Moral responsibility | 1 |
| Movement (music) | 1 |
| Multinomial logistic regression | 1 |
| National innovation system | 1 |
| Natural disaster | 1 |
| Natural gas | 1 |
| Net (polyhedron) | 1 |
| Network effect | 1 |
| Niche market | 1 |
| Normal science | 1 |
| Normalization (sociology) | 1 |
| Normative ethics | 1 |
| North west | 1 |
| Nothing | 1 |
| Nuclear power | 1 |
| Nuclear power plant | 1 |
| Nursing research | 1 |
| Object (grammar) | 1 |
| Occupancy | 1 |
| Officer | 1 |
| Open innovation | 1 |
| Opportunism | 1 |
| Optimism | 1 |
| Organisational change | 1 |
| Orthodoxy | 1 |
| Oxymoron | 1 |
| Path analysis (statistics) | 1 |
| Path dependency | 1 |
| Performativity | 1 |
| Period (music) | 1 |
| Persistence (discontinuity) | 1 |
| Personal mobility | 1 |
| Personality | 1 |
| Photovoltaic system | 1 |
| Planned economy | 1 |
| Plastic bag | 1 |
| Pluvial | 1 |
| Point (geometry) | 1 |
| Policy development | 1 |
| Polluter pays principle | 1 |
| Pooling | 1 |
| Positivism | 1 |
| Posthumanism | 1 |
| Postmodernism | 1 |
| Precipitation | 1 |
| Predation | 1 |
| Predictability | 1 |
| Predictive maintenance | 1 |
| Preference | 1 |
| Presentation (obstetrics) | 1 |
| Presumption | 1 |
| Principal (computer security) | 1 |
| Prism | 1 |
| Professionalization | 1 |
| Project finance | 1 |
| Pronoun | 1 |
| Property (philosophy) | 1 |
| Property rights | 1 |
| Proxy (statistics) | 1 |
| Prudence | 1 |
| Public service | 1 |
| Publishing | 1 |
| Punctuated equilibrium | 1 |
| Questionnaire | 1 |
| Rainwater harvesting | 1 |
| Rapeseed | 1 |
| Raw material | 1 |
| Realism | 1 |
| Redevelopment | 1 |
| Redress | 1 |
| Reference model | 1 |
| Reforestation | 1 |
| Regional development | 1 |
| Regional innovation system | 1 |
| Relocation | 1 |
| Resource allocation | 1 |
| Resource depletion | 1 |
| Resource management (computing) | 1 |
| Responsible Research and Innovation | 1 |
| Reuse | 1 |
| Rhythm | 1 |
| Risk assessment | 1 |
| Root cause | 1 |
| Rope | 1 |
| Rural area | 1 |
| Sanctions | 1 |
| Scalability | 1 |
| Scheme (mathematics) | 1 |
| Scientific evidence | 1 |
| Seawater | 1 |
| Secondary sector of the economy | 1 |
| Sect | 1 |
| Security studies | 1 |
| Sense of agency | 1 |
| Sense of place | 1 |
| Sequence (biology) | 1 |
| Setback | 1 |
| Sharing economy | 1 |
| Simple (philosophy) | 1 |
| Sketch | 1 |
| Skills management | 1 |
| Smart grid | 1 |
| Social business | 1 |
| Social connectedness | 1 |
| Social equality | 1 |
| Social impact assessment | 1 |
| Social institution | 1 |
| Social marketing | 1 |
| Social mobility | 1 |
| Social policy | 1 |
| Social relation | 1 |
| Social security | 1 |
| Social solidarity | 1 |
| Social work | 1 |
| Sociality | 1 |
| Solar energy | 1 |
| sort | 1 |
| Spacecraft | 1 |
| SPARK (programming language) | 1 |
| Spatial ecology | 1 |
| Spatial organization | 1 |
| Spatial variability | 1 |
| Special section | 1 |
| SPHERES | 1 |
| Stability (learning theory) | 1 |
| Stars | 1 |
| Statistical analysis | 1 |
| Structuration theory | 1 |
| Subjectification | 1 |
| Submarine pipeline | 1 |
| Substitution (logic) | 1 |
| Sump (aquarium) | 1 |
| Superordinate goals | 1 |
| Support vector machine | 1 |
| Survey data collection | 1 |
| Sustenance | 1 |
| Swarm behaviour | 1 |
| Table (database) | 1 |
| Tariff | 1 |
| Teaching method | 1 |
| Technological evolution | 1 |
| Technology transfer | 1 |
| Textile | 1 |
| Textile industry | 1 |
| The arctic | 1 |
| The Internet | 1 |
| Thematic map | 1 |
| Theory of the firm | 1 |
| Thermal | 1 |
| Toolbox | 1 |
| Top-down and bottom-up design | 1 |
| TOPSIS | 1 |
| Traceability | 1 |
| Tracing | 1 |
| Track (disk drive) | 1 |
| Tracking (education) | 1 |
| Trajectory | 1 |
| Transaction cost | 1 |
| Transactional leadership | 1 |
| Transitive relation | 1 |
| Transport system | 1 |
| Travel behavior | 1 |
| Trilogy | 1 |
| Trojan horse | 1 |
| Truck | 1 |
| Turbine | 1 |
| Turnover | 1 |
| Umwelt | 1 |
| Uncanny | 1 |
| Uncertainty | 1 |
| Unit (ring theory) | 1 |
| Unitary state | 1 |
| Upgrade | 1 |
| Urban agglomeration | 1 |
| Urban forestry | 1 |
| Usability | 1 |
| Utilitarianism | 1 |
| Valuation (finance) | 1 |
| Value creation | 1 |
| Value proposition | 1 |
| Variable (mathematics) | 1 |
| Variables | 1 |
| Variation (astronomy) | 1 |
| Vegetation (pathology) | 1 |
| Video game | 1 |
| Visualization | 1 |
| Voltage | 1 |
| Warning system | 1 |
| Warrant | 1 |
| Wastewater | 1 |
| Water diversion | 1 |
| Water energy | 1 |
| Water use | 1 |
| Watson | 1 |
| West germany | 1 |
| West virginia | 1 |
| Wilderness | 1 |
| Wildness | 1 |
| Window (computing) | 1 |
| Wonder | 1 |
| Zero (linguistics) | 1 |
| Zoning | 1 |

#### 2.1.5.4 Level 3

x <- lapply(  
 flat\_snow[["concepts"]],  
 function(x) {  
 x[["display\_name"]][x[["level"]] == 3]  
 }  
) |>  
 unlist() |>  
 table() |>  
 as.data.frame() |>   
 rename(  
 l3\_concept = Var1,  
 count = Freq  
 ) |>  
 arrange(desc(count))  
   
writexl::write\_xlsx(x, file.path(".", "data", "concepts\_l3.xlsx"))  
  
knitr::kable(x)

| l3\_concept | count |
| --- | --- |
| Transition (genetics) | 127 |
| Food security | 82 |
| Transformation (genetics) | 74 |
| Social sustainability | 69 |
| Panacea (medicine) | 65 |
| Transition management (governance) | 61 |
| Sustainability organizations | 60 |
| Environmental governance | 34 |
| Adaptive capacity | 30 |
| Legitimacy | 27 |
| Livelihood | 27 |
| Democracy | 26 |
| Grassroots | 26 |
| Sustainable agriculture | 26 |
| Civil society | 25 |
| Collective action | 25 |
| Ecosystem services | 25 |
| Climate change adaptation | 24 |
| Climate governance | 23 |
| Infectious disease (medical specialty) | 20 |
| Urban sustainability | 17 |
| Environmental change | 16 |
| Urban resilience | 16 |
| Agroecology | 14 |
| Energy policy | 12 |
| Multi-level governance | 12 |
| Social transformation | 12 |
| Stewardship (theology) | 12 |
| Deliberation | 11 |
| Promotion (chess) | 11 |
| Technocracy | 11 |
| Thematic analysis | 11 |
| Climate change mitigation | 10 |
| Political ecology | 10 |
| Solidarity | 10 |
| Collaborative governance | 9 |
| Energy system | 9 |
| Global governance | 9 |
| Planetary boundaries | 9 |
| Capitalism | 8 |
| Climate justice | 8 |
| Global warming | 8 |
| Investment (military) | 8 |
| Originality | 8 |
| Sustainable consumption | 8 |
| Climate Finance | 7 |
| Climate resilience | 7 |
| Geopolitics | 7 |
| Hegemony | 7 |
| Mainstreaming | 7 |
| Sustainable business | 7 |
| Agrarian society | 6 |
| Backcasting | 6 |
| Constructive | 6 |
| Degrowth | 6 |
| Dominance (genetics) | 6 |
| Extreme weather | 6 |
| Ideology | 6 |
| Natural resource management | 6 |
| Political economy of climate change | 6 |
| Scopus | 6 |
| Through-the-lens metering | 6 |
| Traditional knowledge | 6 |
| Agricultural productivity | 5 |
| Corporate sustainability | 5 |
| Ecological niche | 5 |
| Green growth | 5 |
| Landscape ecology | 5 |
| Social movement | 5 |
| Socioeconomic status | 5 |
| Urban density | 5 |
| Boundary object | 4 |
| Carbon fibers | 4 |
| Ecological resilience | 4 |
| Electronic business | 4 |
| Elite | 4 |
| Emancipation | 4 |
| Energy security | 4 |
| Global change | 4 |
| Health policy | 4 |
| Incrementalism | 4 |
| Legitimation | 4 |
| Opposition (politics) | 4 |
| Pastoralism | 4 |
| Product-service system | 4 |
| Project governance | 4 |
| Risk governance | 4 |
| Servant leadership | 4 |
| Social network analysis | 4 |
| Socio-ecological system | 4 |
| Sustainable transport | 4 |
| Value chain | 4 |
| Vulnerability assessment | 4 |
| 2019-20 coronavirus outbreak | 3 |
| Agricultural diversification | 3 |
| Articulation (sociology) | 3 |
| Biodiversity conservation | 3 |
| Bureaucracy | 3 |
| Causal loop diagram | 3 |
| Change management (ITSM) | 3 |
| Citation analysis | 3 |
| Climate policy | 3 |
| Collective identity | 3 |
| Collective leadership | 3 |
| Community resilience | 3 |
| Convention on Biological Diversity | 3 |
| Diplomacy | 3 |
| Downscaling | 3 |
| Ecological footprint | 3 |
| Ecosystem management | 3 |
| Ecosystem-based management | 3 |
| Education for sustainable development | 3 |
| Electricity generation | 3 |
| Environmental politics | 3 |
| Integrated water resources management | 3 |
| Kyoto Protocol | 3 |
| Land use, land-use change and forestry | 3 |
| Learning sciences | 3 |
| Network governance | 3 |
| Regime shift | 3 |
| Settlement (finance) | 3 |
| Smart city | 3 |
| Social network (sociolinguistics) | 3 |
| Sovereignty | 3 |
| Stormwater | 3 |
| Strategic environmental assessment | 3 |
| Sustainable energy | 3 |
| Systematic review | 3 |
| Technological innovation system | 3 |
| Transferability | 3 |
| Urban climate | 3 |
| Urban ecosystem | 3 |
| Urbanism | 3 |
| Water scarcity | 3 |
| Web of science | 3 |
| Agricultural biodiversity | 2 |
| Beijing | 2 |
| Biorefinery | 2 |
| Business process | 2 |
| Carbon footprint | 2 |
| Citizenship | 2 |
| Climate risk | 2 |
| Climate science | 2 |
| Conservation psychology | 2 |
| Conservation science | 2 |
| Contextualization | 2 |
| CRISPR | 2 |
| Destinations | 2 |
| Devolution (biology) | 2 |
| Ecological economics | 2 |
| Ecological health | 2 |
| Ecological modernization | 2 |
| Energy law | 2 |
| Environmentalism | 2 |
| Fisheries management | 2 |
| Global value chain | 2 |
| Governmentality | 2 |
| Green economy | 2 |
| Health promotion | 2 |
| Knowledge integration | 2 |
| Las vegas | 2 |
| Leadership | 2 |
| Leadership studies | 2 |
| Low-carbon economy | 2 |
| Marine ecosystem | 2 |
| Marine protected area | 2 |
| Orchestration | 2 |
| Phenotype | 2 |
| Phoenix | 2 |
| Polity | 2 |
| Population growth | 2 |
| Qualitative analysis | 2 |
| Rebound effect (conservation) | 2 |
| Regulatory state | 2 |
| Representation (politics) | 2 |
| Service provider | 2 |
| Shared leadership | 2 |
| Social identity theory | 2 |
| Social vulnerability | 2 |
| Software development | 2 |
| Stakeholder analysis | 2 |
| Stakeholder theory | 2 |
| Sustainability reporting | 2 |
| Sustainable Agriculture Innovation Network | 2 |
| Sustainable management | 2 |
| Sustainable tourism | 2 |
| Sustainable Value | 2 |
| Systemic risk | 2 |
| Threatened species | 2 |
| Transnational governance | 2 |
| Urban design | 2 |
| Urban ecology | 2 |
| Value network | 2 |
| Virtue ethics | 2 |
| Welfare state | 2 |
| Wildlife conservation | 2 |
| Agonism | 1 |
| Agribusiness | 1 |
| Agricultural policy | 1 |
| Agroecosystem | 1 |
| Air travel | 1 |
| Antibiotic resistance | 1 |
| Aquaculture | 1 |
| Aquifer | 1 |
| Artisanal fishing | 1 |
| Austerity | 1 |
| Behaviour change | 1 |
| Betweenness centrality | 1 |
| Bibliographic coupling | 1 |
| Big Five personality traits | 1 |
| Biodiesel | 1 |
| Bioenergy | 1 |
| Biological integrity | 1 |
| Biome | 1 |
| Bioproducts | 1 |
| Business analysis | 1 |
| Business value | 1 |
| Carbon dioxide in Earth’s atmosphere | 1 |
| Carbon neutrality | 1 |
| Carbon sequestration | 1 |
| Carnivore | 1 |
| Chimera (genetics) | 1 |
| Choreography | 1 |
| Climate model | 1 |
| Cloud computing security | 1 |
| Co-citation | 1 |
| Code (set theory) | 1 |
| Community forestry | 1 |
| Compartmentalization (fire protection) | 1 |
| Conditionality | 1 |
| Confirmatory factor analysis | 1 |
| Conservatism | 1 |
| Construals | 1 |
| Cooperative learning | 1 |
| Coral bleaching | 1 |
| Coral reef protection | 1 |
| Critical realism (philosophy of perception) | 1 |
| Cultural geography | 1 |
| Data quality | 1 |
| Decolonization | 1 |
| Desalination | 1 |
| Dingo | 1 |
| Distributive justice | 1 |
| Dormancy | 1 |
| Duopoly | 1 |
| Earth Summit | 1 |
| Eco-innovation | 1 |
| Economic collapse | 1 |
| Economic governance | 1 |
| Economic interventionism | 1 |
| Economic reform | 1 |
| Economic shortage | 1 |
| Ecosystem approach | 1 |
| Egalitarianism | 1 |
| Electrification | 1 |
| Energy engineering | 1 |
| Energy intensity | 1 |
| Energy management | 1 |
| Energy market | 1 |
| Energy planning | 1 |
| Energy storage | 1 |
| Energy supply | 1 |
| Environmental consciousness | 1 |
| Environmental issues with coral reefs | 1 |
| Environmental management system | 1 |
| Environmental Sustainability Index | 1 |
| Epistemic virtue | 1 |
| Epoch (astronomy) | 1 |
| Erasmus+ | 1 |
| Exploitation of natural resources | 1 |
| Exploratory factor analysis | 1 |
| Extreme heat | 1 |
| Fashion industry | 1 |
| Fast fashion | 1 |
| Fisheries Research | 1 |
| Fishing industry | 1 |
| Flood mitigation | 1 |
| Flood risk management | 1 |
| Focal point | 1 |
| Food sector | 1 |
| Fukushima Nuclear Accident | 1 |
| Game Developer | 1 |
| Global health | 1 |
| Health administration | 1 |
| Health equity | 1 |
| Health informatics | 1 |
| Health security | 1 |
| Healthcare system | 1 |
| Historical geography | 1 |
| Hospitality | 1 |
| Human genetics | 1 |
| Human–wildlife conflict | 1 |
| Hydrogen fuel | 1 |
| Impact investing | 1 |
| Industrial ecology | 1 |
| Institutional investor | 1 |
| Integrated coastal zone management | 1 |
| Intergenerational equity | 1 |
| Internal consistency | 1 |
| International investment | 1 |
| Intrapersonal communication | 1 |
| Ionic liquid | 1 |
| Knowledge creation | 1 |
| Land cover | 1 |
| Land grabbing | 1 |
| Land management | 1 |
| Land-use planning | 1 |
| Legal realism | 1 |
| Life-cycle assessment | 1 |
| Linkage (software) | 1 |
| Mains electricity | 1 |
| Marketization | 1 |
| Medical genetics | 1 |
| Meta-ethics | 1 |
| Militarization | 1 |
| Millennium Development Goals | 1 |
| Modal shift | 1 |
| Negative feedback | 1 |
| New england | 1 |
| New horizons | 1 |
| Nomological network | 1 |
| Non-renewable resource | 1 |
| Normative social influence | 1 |
| Nuclear disaster | 1 |
| Ocean chemistry | 1 |
| Offshore wind power | 1 |
| Oppression | 1 |
| Organic farming | 1 |
| Overfishing | 1 |
| Overgrazing | 1 |
| Pacific islanders | 1 |
| Parliament | 1 |
| Participatory design | 1 |
| Per capita | 1 |
| Photovoltaics | 1 |
| Plasmodium falciparum | 1 |
| Poaching | 1 |
| Populism | 1 |
| Project commissioning | 1 |
| Project management triangle | 1 |
| Project portfolio management | 1 |
| Prosumer | 1 |
| Quality assurance | 1 |
| Random graph | 1 |
| Rangeland management | 1 |
| Redistribution (election) | 1 |
| Relationship marketing | 1 |
| Renewable fuels | 1 |
| Requirements engineering | 1 |
| Resilience of coral reefs | 1 |
| Resource curse | 1 |
| Resource recovery | 1 |
| Return on marketing investment | 1 |
| Ribosomal RNA | 1 |
| Right to the city | 1 |
| Riparian zone | 1 |
| Risk perception | 1 |
| RNA | 1 |
| Robustness (evolution) | 1 |
| Ruderal species | 1 |
| Rule of law | 1 |
| Rurality | 1 |
| Sampling frame | 1 |
| Science Citation Index | 1 |
| Seagrass | 1 |
| Social activism | 1 |
| Social conflict | 1 |
| Social determinants of health | 1 |
| Social injustice | 1 |
| Social practice | 1 |
| Social reproduction | 1 |
| Soil carbon | 1 |
| Stock assessment | 1 |
| Stock market | 1 |
| Storytelling | 1 |
| Strategic financial management | 1 |
| Subsistence agriculture | 1 |
| Supply chain management | 1 |
| Sustainable design | 1 |
| Sustainable production | 1 |
| Sustainable society | 1 |
| Technical Journalism | 1 |
| The Conceptual Framework | 1 |
| Total factor productivity | 1 |
| Tragedy of the commons | 1 |
| Transcription factor | 1 |
| Urban agriculture | 1 |
| Urban greening | 1 |
| Urban politics | 1 |
| Vagueness | 1 |
| Video game design | 1 |
| Vitalism | 1 |
| Vulnerability index | 1 |
| Wage labour | 1 |
| Water infrastructure | 1 |
| Water sector | 1 |
| Water security | 1 |
| Welfare reform | 1 |
| Zero-energy building | 1 |

#### 2.1.5.5 Level 4

x <- lapply(  
 flat\_snow[["concepts"]],  
 function(x) {  
 x[["display\_name"]][x[["level"]] == 4]  
 }  
) |>  
 unlist() |>  
 table() |>  
 as.data.frame() |>   
 rename(  
 l4\_concept = Var1,  
 count = Freq  
 ) |>  
 arrange(desc(count))  
   
writexl::write\_xlsx(x, file.path(".", "data", "concepts\_l4.xlsx"))  
   
knitr::kable(x)

| l4\_concept | count |
| --- | --- |
| Sustainability science | 75 |
| Energy transition | 64 |
| Food systems | 64 |
| Coronavirus disease 2019 (COVID-19) | 20 |
| Democratization | 8 |
| Food policy | 6 |
| Authoritarianism | 5 |
| Business relationship management | 4 |
| Ecosystem health | 3 |
| United Nations Framework Convention on Climate Change | 3 |
| Urban metabolism | 3 |
| Complementation | 2 |
| Electricity system | 2 |
| Fisheries law | 2 |
| Neuroleadership | 2 |
| Scrum | 2 |
| Stormwater management | 2 |
| Action learning | 1 |
| Artemisinin | 1 |
| Aviation biofuel | 1 |
| Biorefining | 1 |
| Blue carbon | 1 |
| Business process modeling | 1 |
| Business-to-government | 1 |
| Cas9 | 1 |
| Competence-based management | 1 |
| Coral reef organizations | 1 |
| Critical geography | 1 |
| Data governance | 1 |
| Deliberative democracy | 1 |
| Development geography | 1 |
| Ecological forecasting | 1 |
| Environmental design and planning | 1 |
| Exponential random graph models | 1 |
| Fisheries science | 1 |
| Food insecurity | 1 |
| Genome editing | 1 |
| Green chemistry | 1 |
| Groundwater recharge | 1 |
| Hydrogen vehicle | 1 |
| Influencer marketing | 1 |
| Jatropha | 1 |
| Legal pluralism | 1 |
| Malmquist index | 1 |
| Market capitalization | 1 |
| Measurement of biodiversity | 1 |
| Millennium Ecosystem Assessment | 1 |
| Natural capital | 1 |
| Network security policy | 1 |
| Non-coding RNA | 1 |
| Nucleic acid structure | 1 |
| Placemaking | 1 |
| Project charter | 1 |
| Psychometric testing | 1 |
| Regime change | 1 |
| Representative Concentration Pathways | 1 |
| Repressor | 1 |
| Requirement | 1 |
| Ribonucleoprotein | 1 |
| Ribosome | 1 |
| Scientific consensus | 1 |
| Seed dormancy | 1 |
| Separate spheres | 1 |
| Social movement theory | 1 |
| Solidarity economy | 1 |
| Sustainable land management | 1 |
| Transfer RNA | 1 |

#### 2.1.5.6 Level 5

x <- lapply(  
 flat\_snow[["concepts"]],  
 function(x) {  
 x[["display\_name"]][x[["level"]] == 5]  
 }  
) |>  
 unlist() |>  
 table() |>  
 as.data.frame() |>   
 rename(  
 l5\_concept = Var1,  
 count = Freq  
 ) |>  
 arrange(desc(count))  
   
writexl::write\_xlsx(x, file.path(".", "data", "concepts\_l5.xlsx"))  
  
knitr::kable(x)

| l5\_concept | count |
| --- | --- |
| Pandemic | 14 |
| Business transformation | 4 |
| Complement (music) | 2 |
| Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) | 2 |
| Artifact-centric business process model | 1 |
| Critical security studies | 1 |
| Guide RNA | 1 |
| Operator (biology) | 1 |
| Project stakeholder | 1 |
| Pseudouridine | 1 |
| Public Sector Marketing | 1 |
| Requirements traceability | 1 |
| Ribosome biogenesis | 1 |
| Small nucleolar RNA | 1 |
| Stratification (seeds) | 1 |
| Time geography | 1 |
| Total human ecosystem | 1 |