TITLE X

Supplemental materials for submittal to X

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Contents

Supplemental Materials Summary

Narrative to be added later.

Variable Summary

Below is a list of the categorical variables generated from the literature reviews

Table 1: Table T1: Variable Descriptions

Variable Name	**Description**
Year	Year of citation
Solution Proposed	Was a solution proposed?
Solution Implemented	Was a solution implemented?
Solution Type	If a solution was proposed, what was the solution type? Groups include: Technology, Policy, Institutional, Social, Economic, Ecological, and Educational.
Computational Model Used	Was a computational model used?
Researcher Type	What was the research type? Groups include: NGO, English, Math, Computer Science, Physics, Engineering, Interdisciplinary, Social Science, Economics, Agriculture, and Other
Stakeholder Type	What was the stakeholder type? Groups include: Farmers, Combined Government, Combined Coalition, Combined Industry, Migrants, Youth, Public, Univerity, and Experts
Stakeholder Engagment Scale - Ghodsvali	If a stakeholder was engaged, categorization of the engagement using the Ghodsvali scale. Groups include: Nominal, Instrumental, Representation, and Transformative
Stakeholder Engagment Scale - IAP2	If a stakeholder was engaged, categorization of the engagement using the IAP2 scale. Groups include: Data Gathering, Inform, Consult, Involve, Collaborate, and Empower
Stakeholder Engagement Scale - Local	If a stakeholder was engaged, categorization of the engagement using a customized scale. Groups include: Researcher, Data Gathering, Inform, Perspectives, Planning, Identify, Envision, and Implement
Geographical Type	What the geography type? Groups include: Not Described, Local, Regional, National, Multinational, Global, and No Geography

Chi-Square Testing

Chi Square Testing: solution proposed or not vs. vs. stakeholder engagement

Chi Square and Fishers Exact Test on contingency table with Solution/No Solution as the explanatory variable, and engaged stakeholder/did not engage stakeholder as the response variable.

ChiSquare = 26: Fishers Exact Test Odds Ratio: 10: Not Independent

Both chi square and fishers exact test were significant, with a chi square approximation of ~26, which is well above the critical value (3.84 with one degree of freedom). Fishers Exact Test returned an odds ratio of ~10. The alternative hypothesis: true odds ratio is not equal to 1, therefore the null hypothesis is rejected - the groups are not independent.

The Fishers Exact Test defaults to associating the odds ratio (which can represent effect size) with the first cell. In this instance "The odds of having a solution is 10 times that for an engaged stakeholder". You could flip the response and explanatory variables, but the odds ratio would stay the same.

For more info on this topic see: Kim HY. Statistical notes for clinical researchers: Chi-squared test and Fisher's exact test. Restor Dent Endod. 2017 May;42(2):152-155. doi: 10.5395/rde.2017.42.2.152. Epub 2017 Mar 30. PMID: 28503482; PMCID: PMC5426219.

```
##          stakeholder
## solution  M  NM
##     [1,] 13   5
##     [2,] 95 370

## Number of cases in table: 483
## Number of factors: 2
## Test for independence of all factors:
##  Chisq = 26.776, df = 1, p-value = 2.285e-07
##  Chi-squared approximation may be incorrect

##
##  Fisher's Exact Test for Count Data
##
## data:  solution_stakeholder
## p-value = 5.864e-06
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
##   3.266331 36.933516
## sample estimates:
## odds ratio
##   10.06035

##
## Barnard's Unconditional Test
##
##             Treatment I Treatment II
## Outcome I            13            5
## Outcome II           95          370
##
## Null hypothesis: Treatments have no effect on the outcomes
## Score statistic = -5.17455
## Nuisance parameter = 0.022 (One sided), 0.022 (Two sided)
## P-value = 2.48239e-06 (One sided), 2.48239e-06 (Two sided)
```

Chi Square Testing: solution proposed or not vs. computational model used or not?

Chi Square and Fishers Exact Test on the contingency table with solution proposed (solution/no solution) as the explanatory variable, and whether a computational model used (model/no model) as the response variable.

ChiSquare = .57: Fishers Exact Test Odds Ratio = .668: Independent

Both chi square and fishers exact test (FET) were insignificant/borderline, with a chi square approximation of ~.57, which is well below to the critical value (3.84 for one degree of freedom). FET returned an odds ratio of under 1, therefore the null is accepted - the groups are independent.

The FET defaults to associating the odds ratio (which can represent effect size) with the first cell. In this instance "The odds of having a solution is .67 times that for having a model". You could flip the response and explanatory variables, but the odds ratio would stay the same.

```
##          model
## solution   M NM
##     [1,]  13  5
##     [2,] 370 95
```

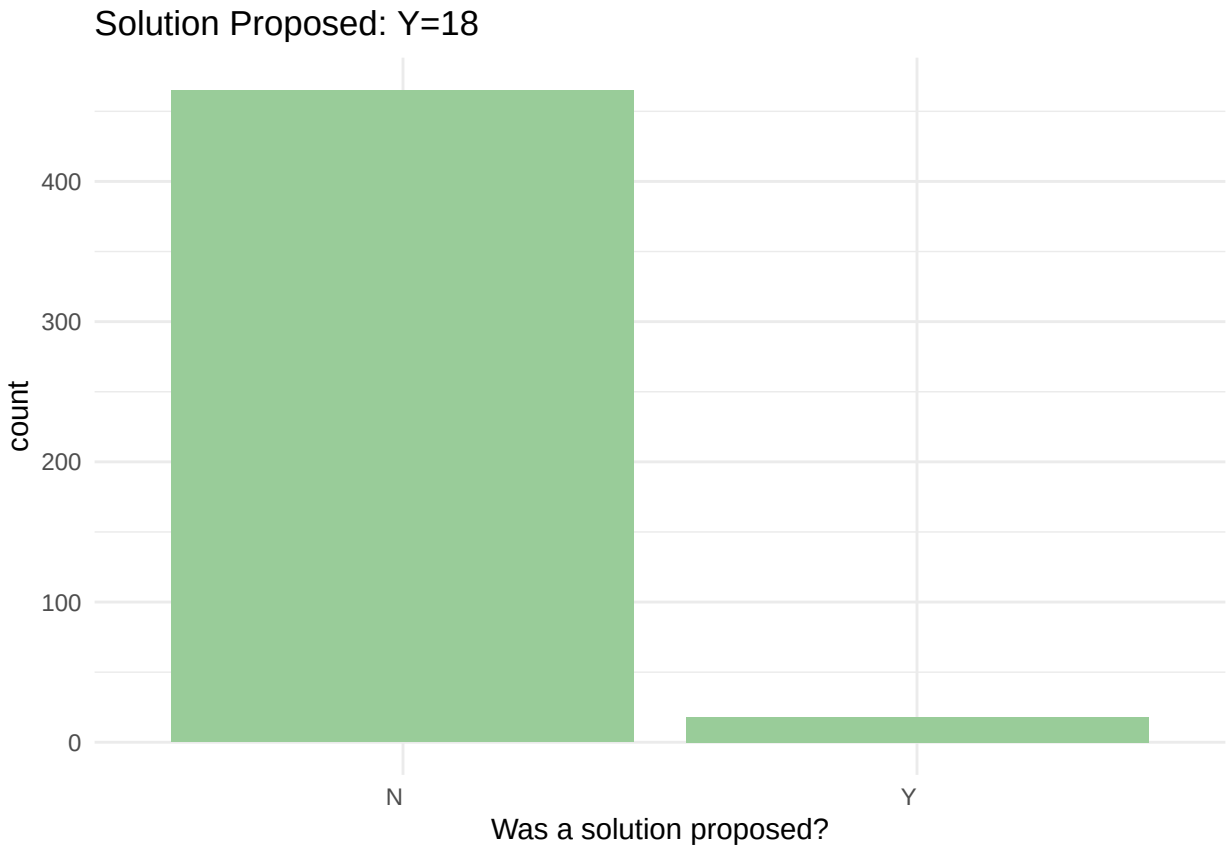
```
## Number of cases in table: 483
## Number of factors: 2
## Test for independence of all factors:
##  Chisq = 0.5699, df = 1, p-value = 0.4503
##  Chi-squared approximation may be incorrect
```

```
##
##  Fisher's Exact Test for Count Data
##
## data:  solution_model
## p-value = 0.5512
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
##  0.2167592 2.4540598
## sample estimates:
## odds ratio
##  0.6681878
```

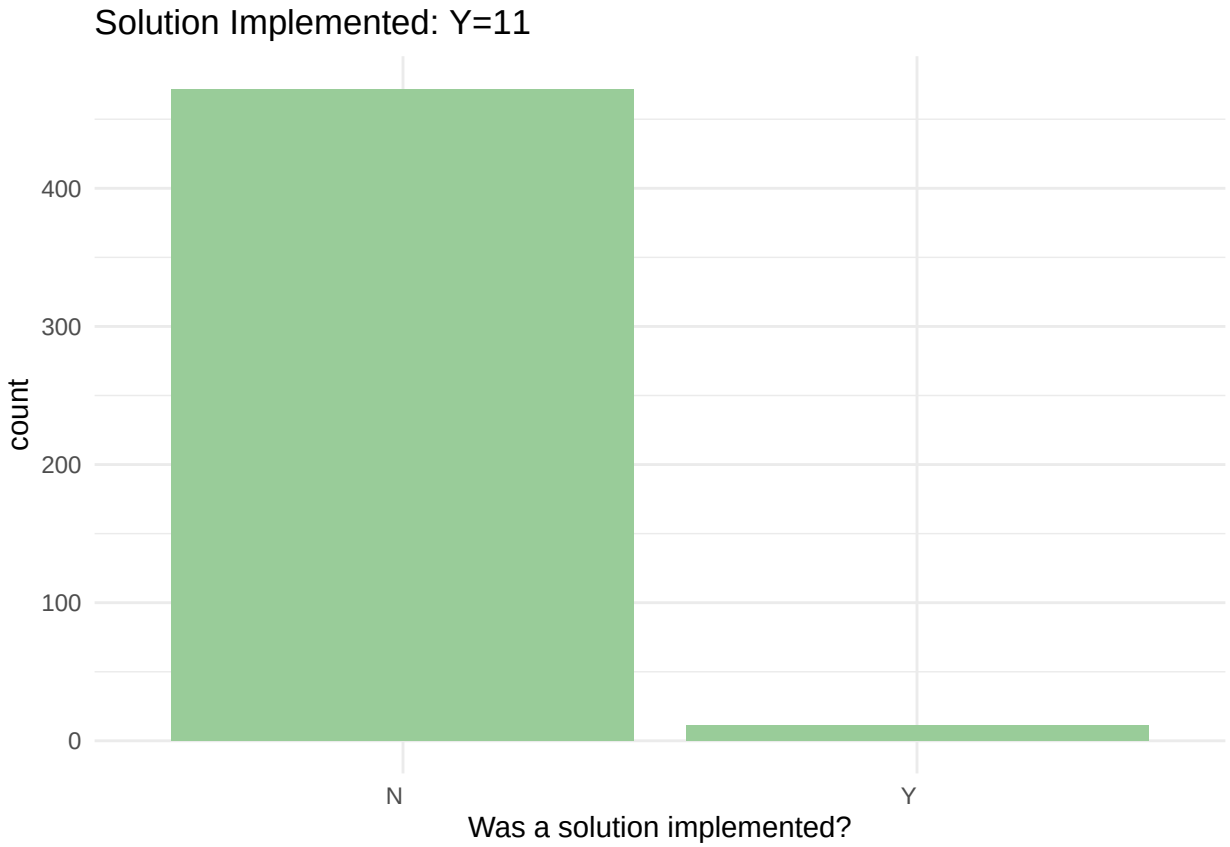
```
##
## Barnard's Unconditional Test
##
##            Treatment I Treatment II
## Outcome I           13            5
## Outcome II         370           95
##
## Null hypothesis: Treatments have no effect on the outcomes
## Score statistic = 0.754895
## Nuisance parameter = 0.99 (One sided), 0.01 (Two sided)
## P-value = 0.275902 (One sided), 0.510281 (Two sided)
```

Summary Statistics Graphs

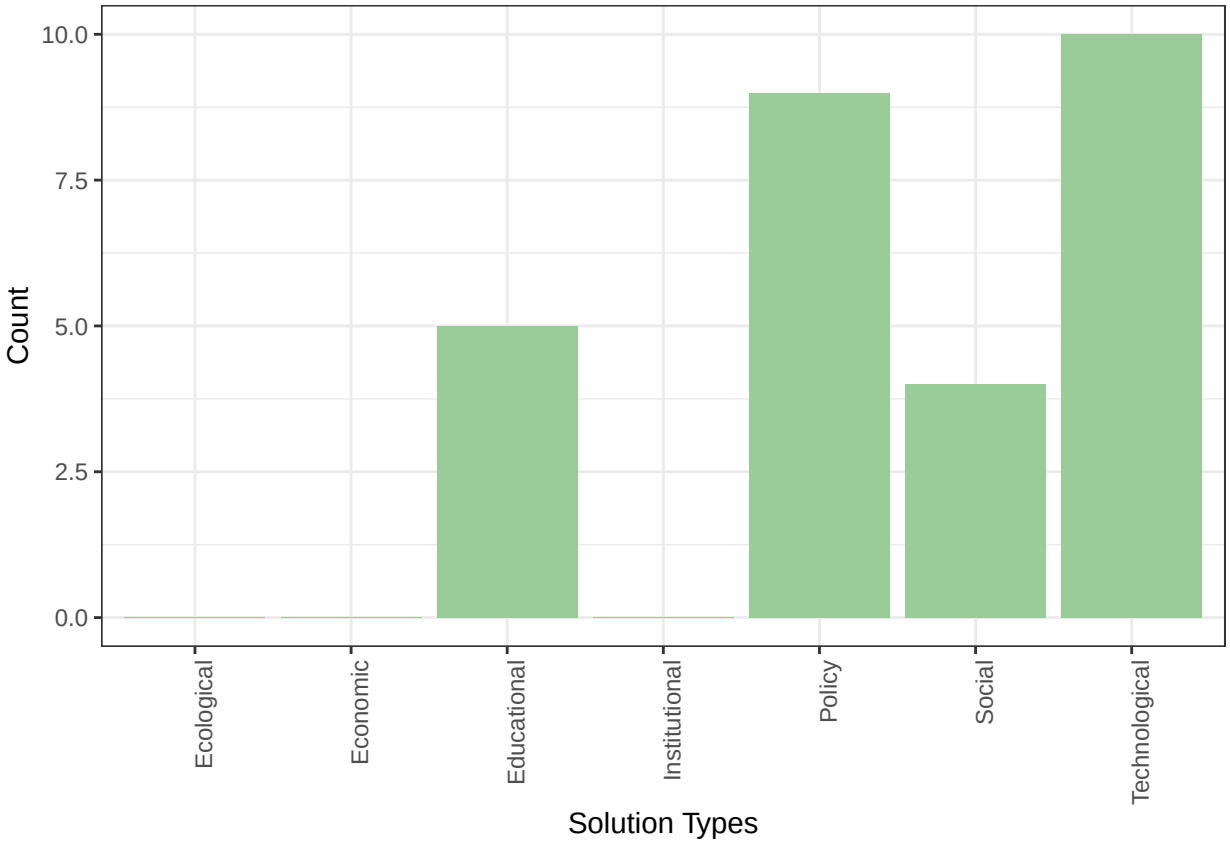
Were solutions proposed in the set of all papers?



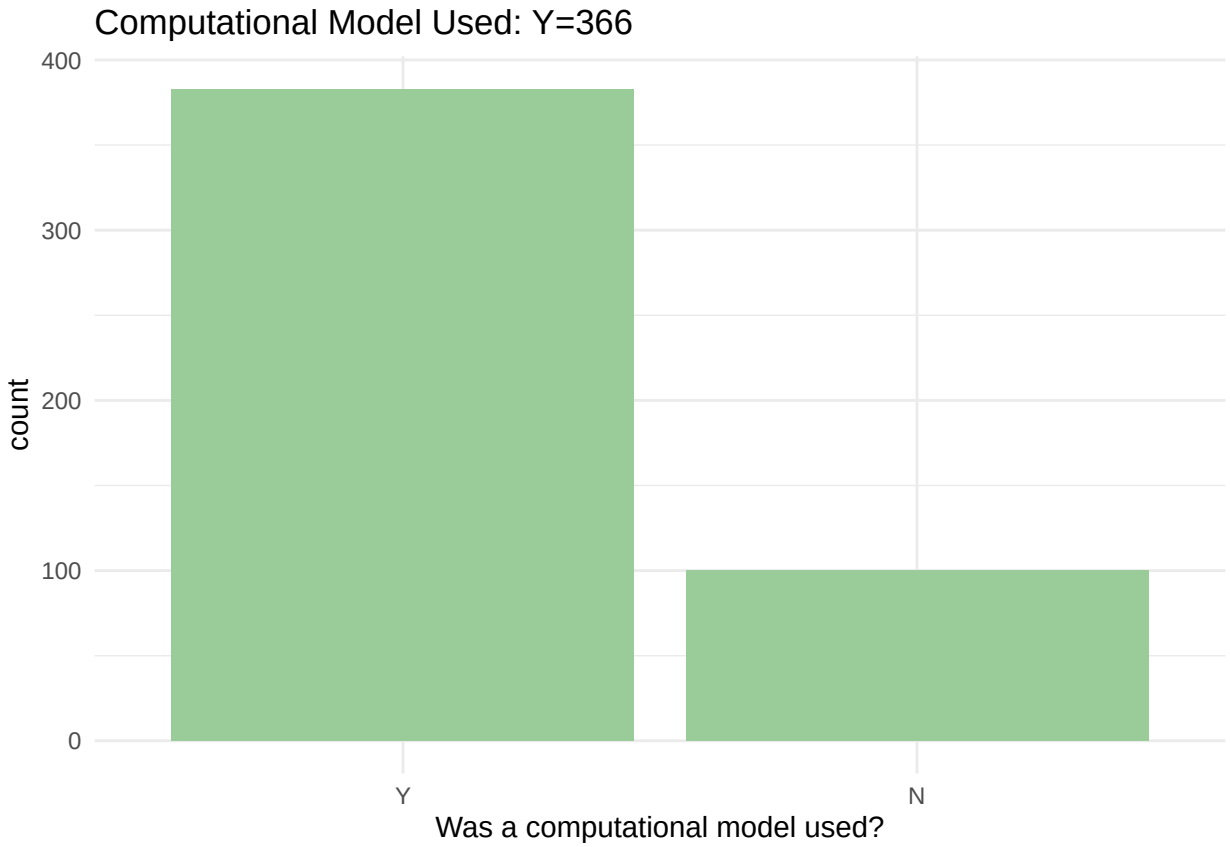
Were solutions implemented in the set of all papers?



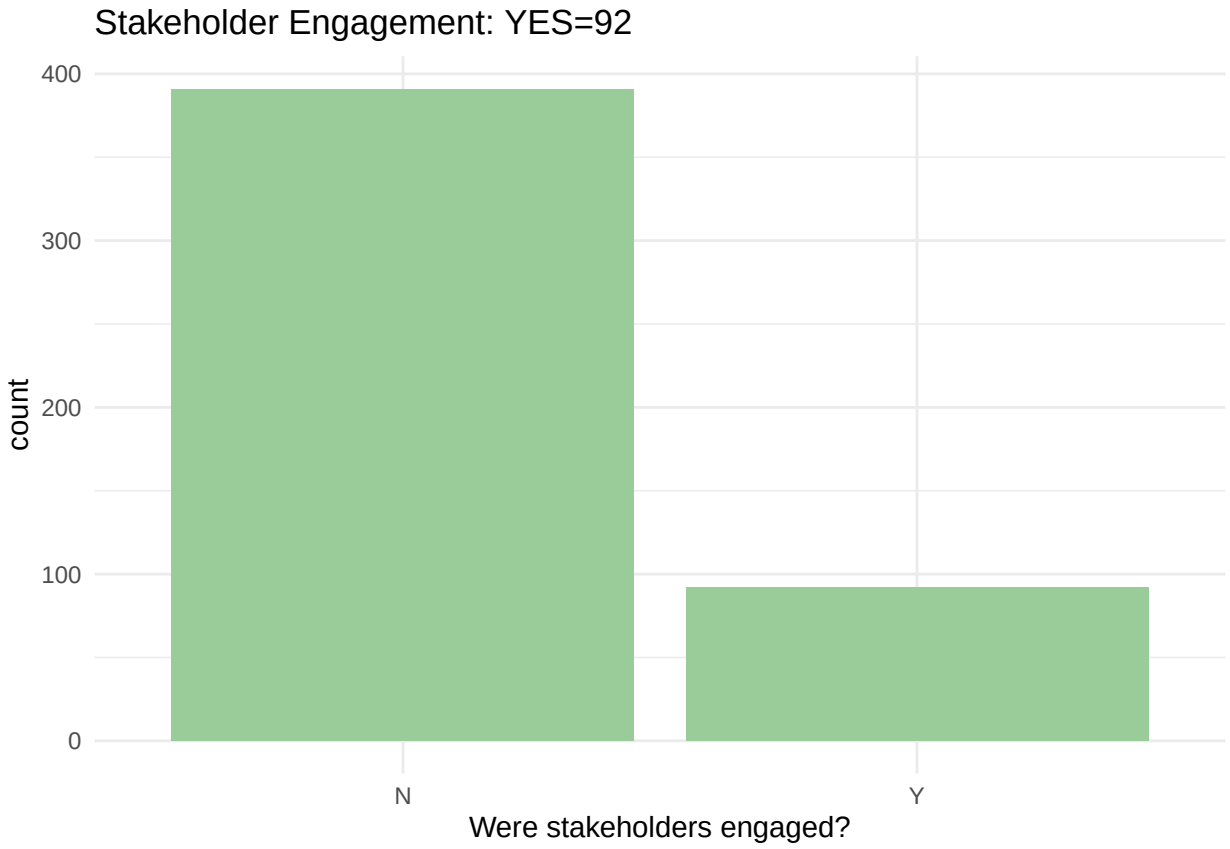
What were the solution types?



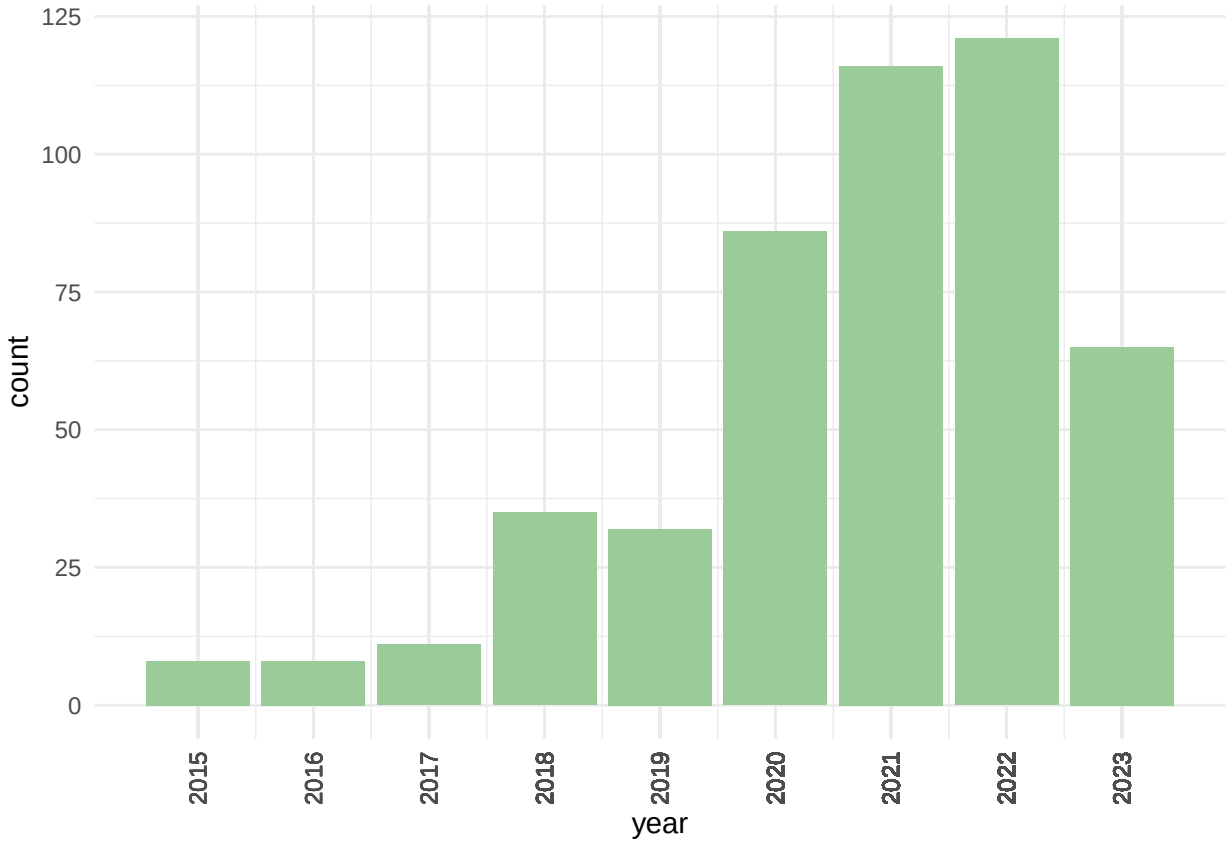
Was a computational model used?



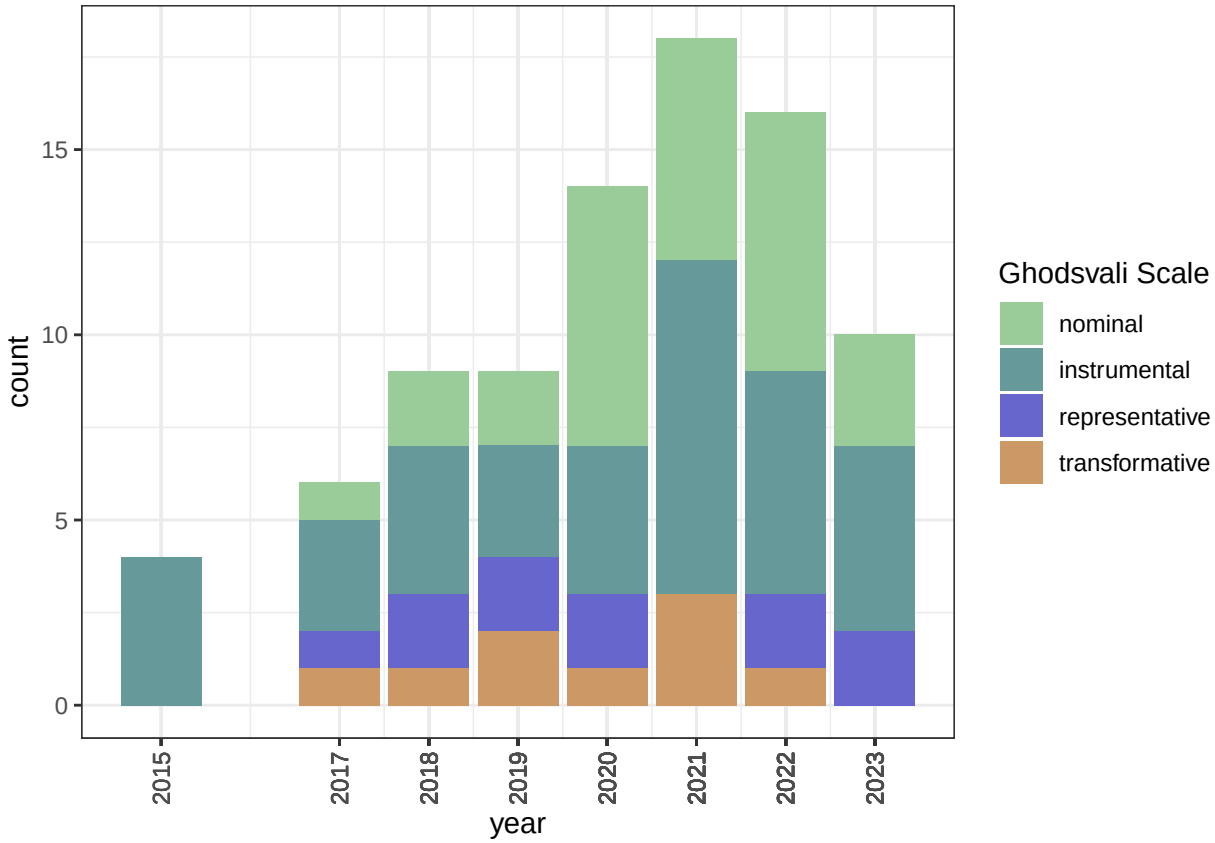
Were stakeholders engaged?



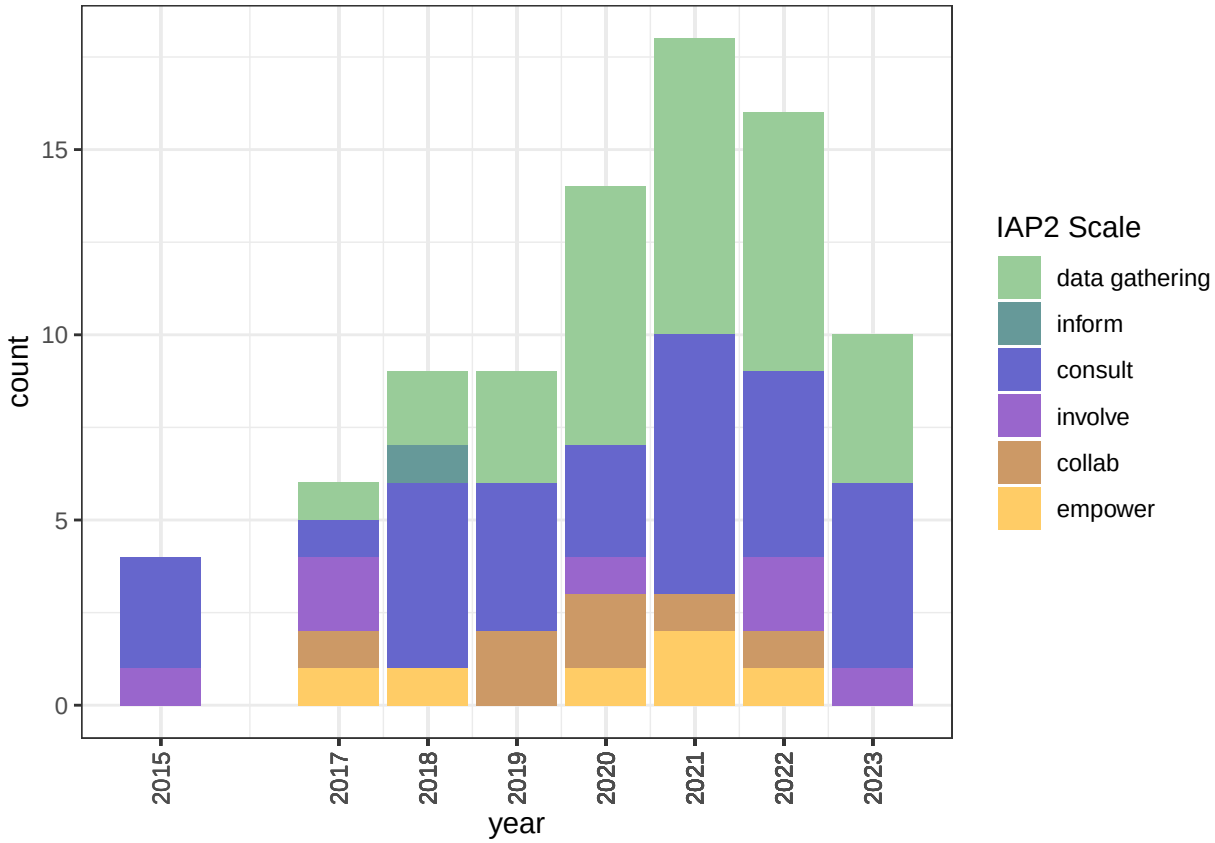
All FEWS papers by year



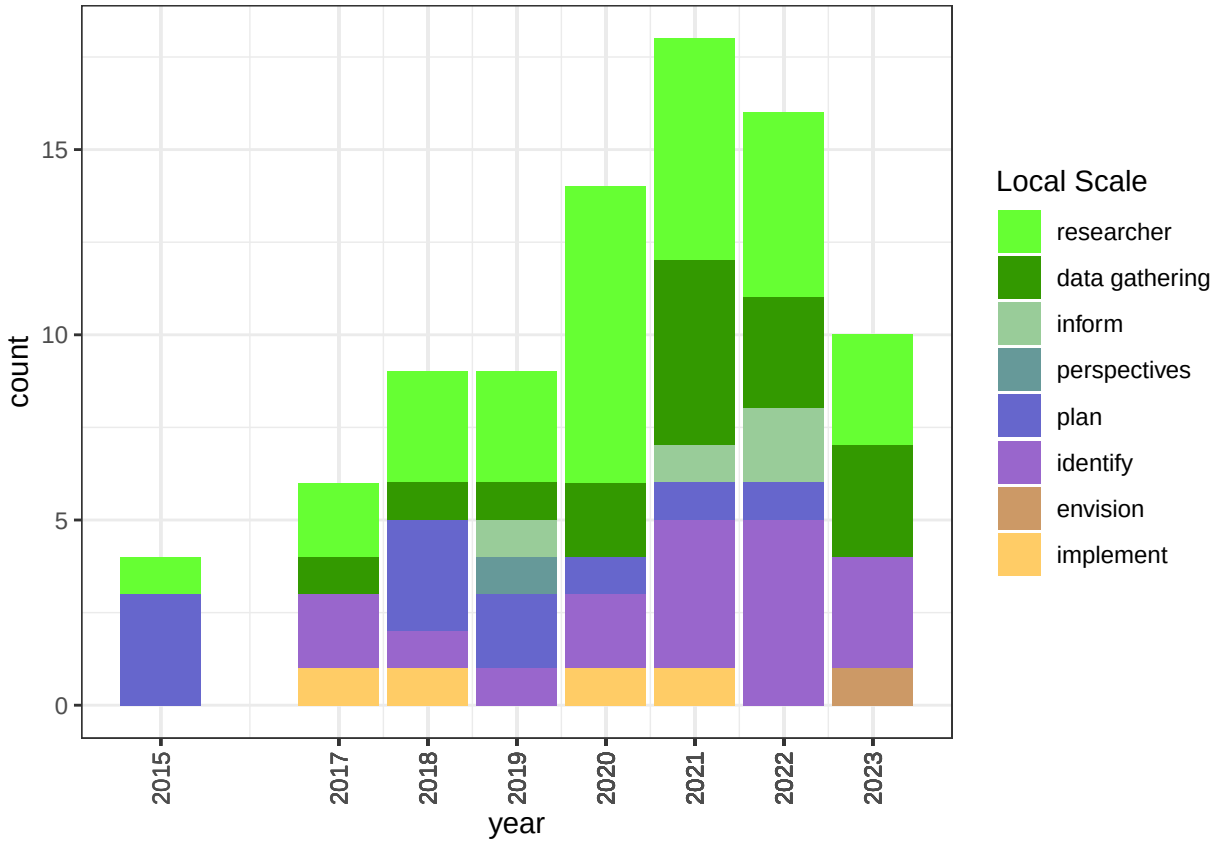
Level of stakeholder engagement by year - Ghodsvali scale



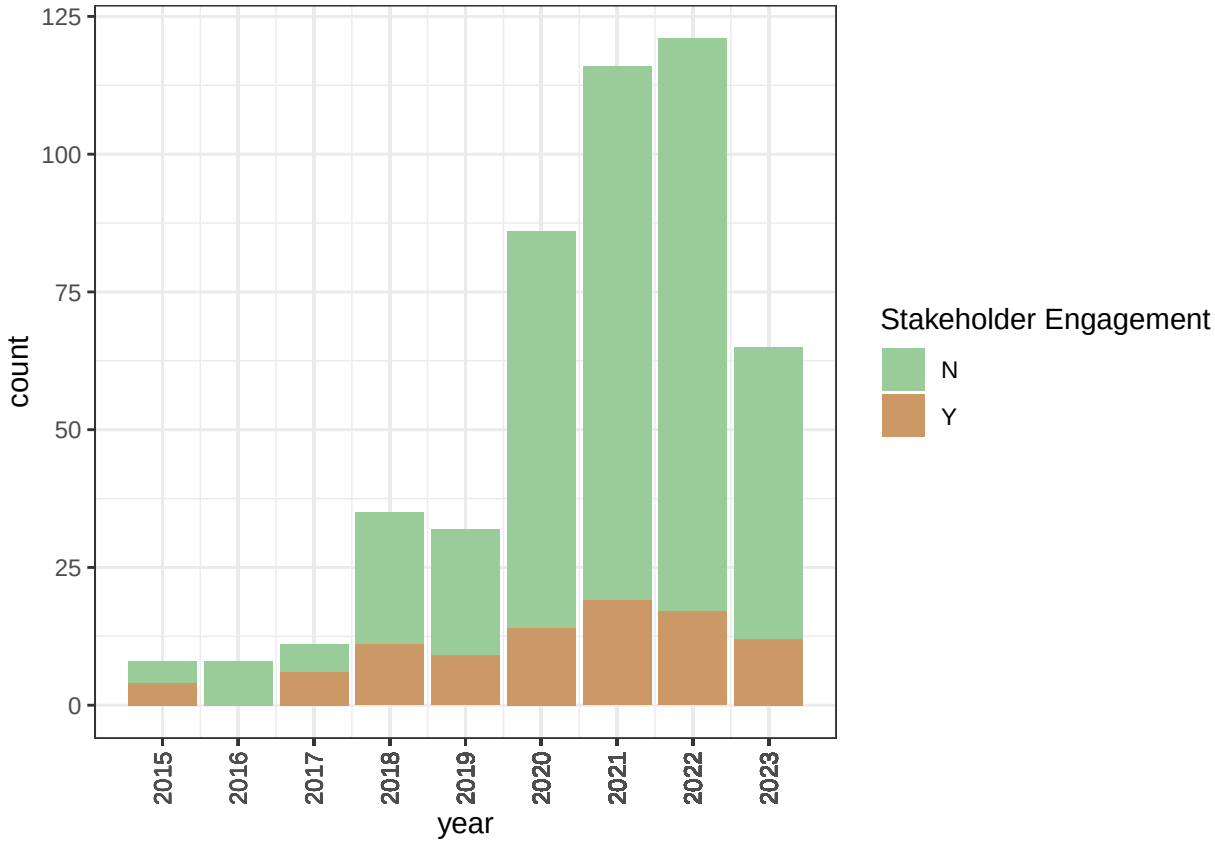
Level of stakeholder engagement by year - IAP2 scale



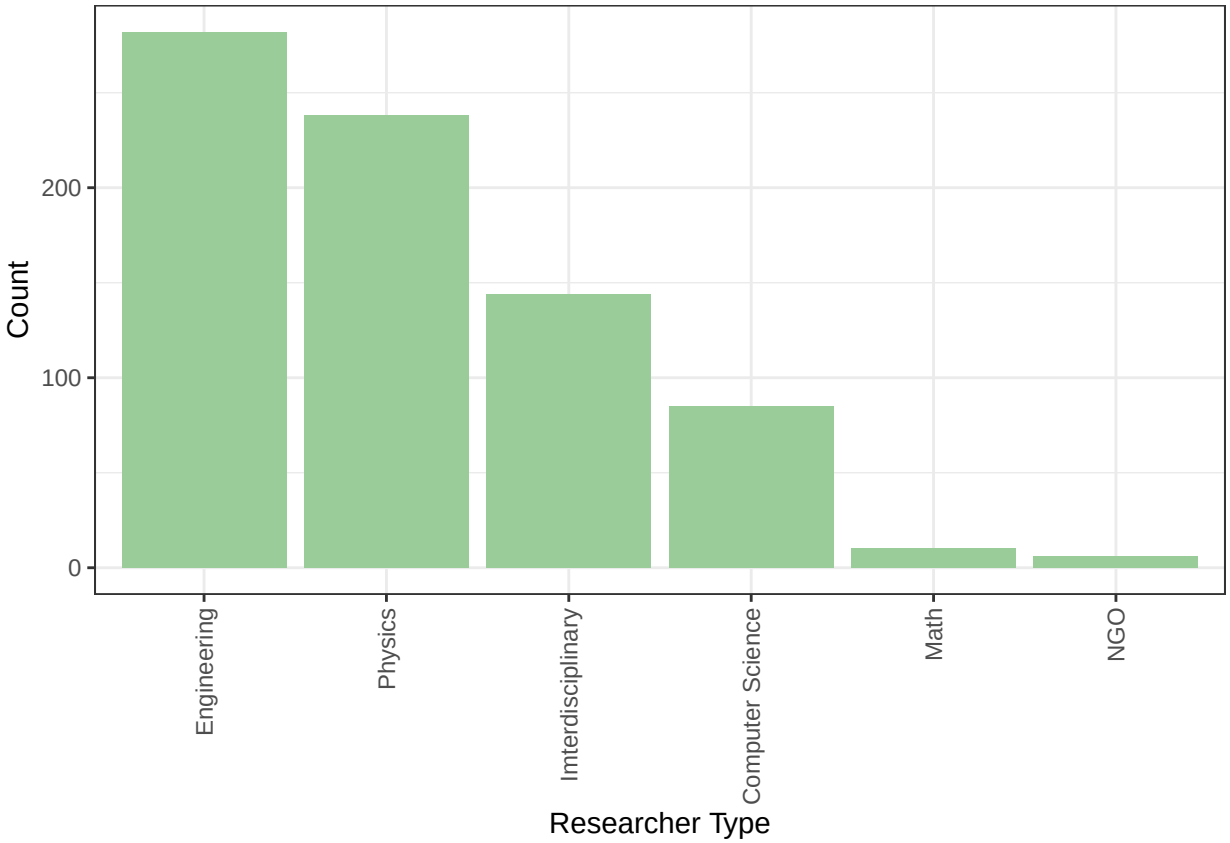
Level of stakeholder engagement by year - Local scale



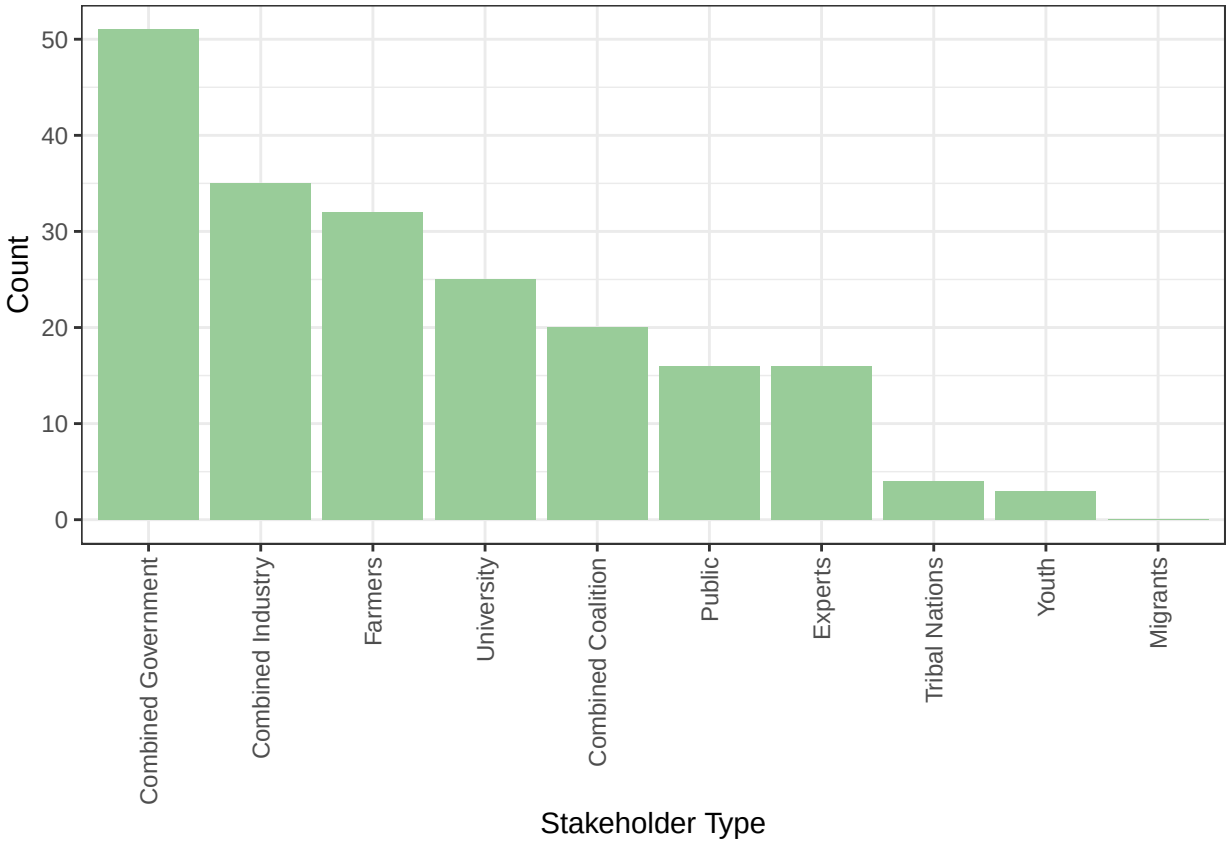
Stakeholder engagement by year



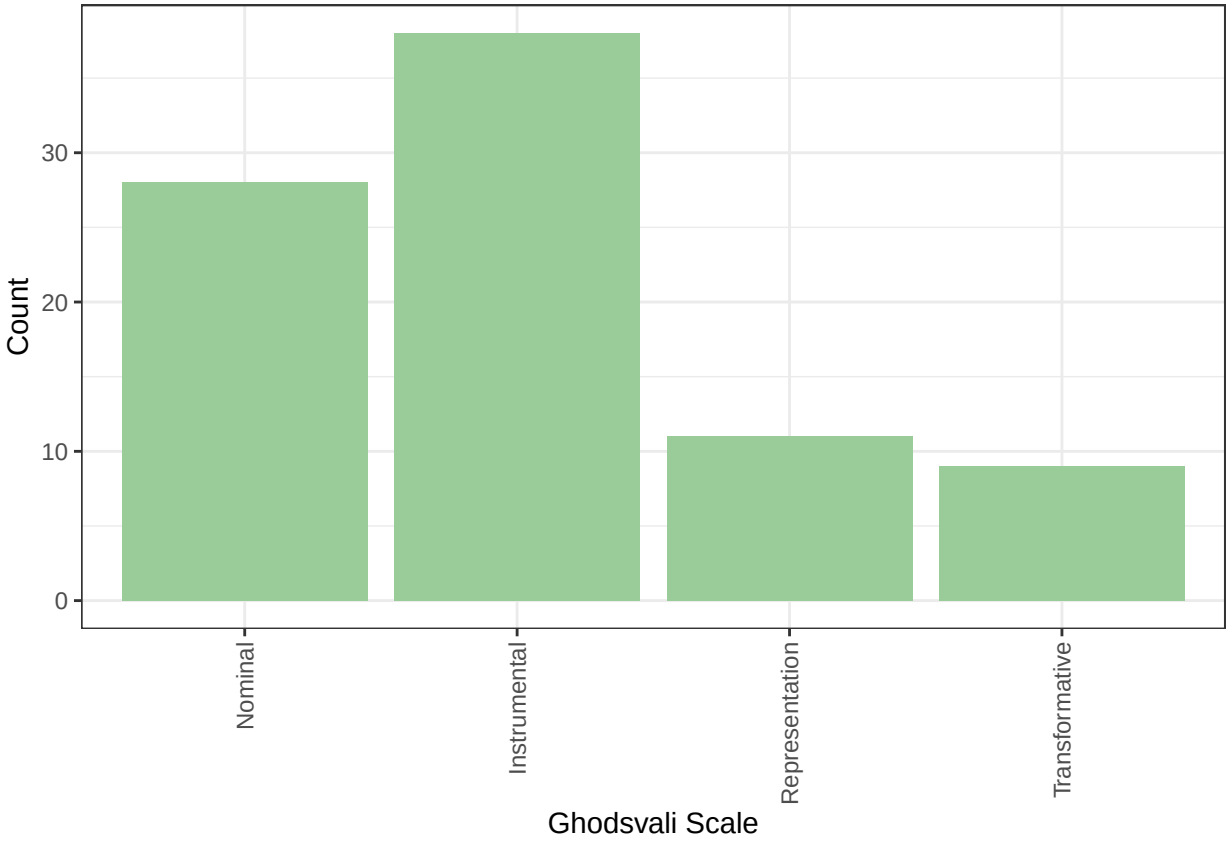
Researcher types



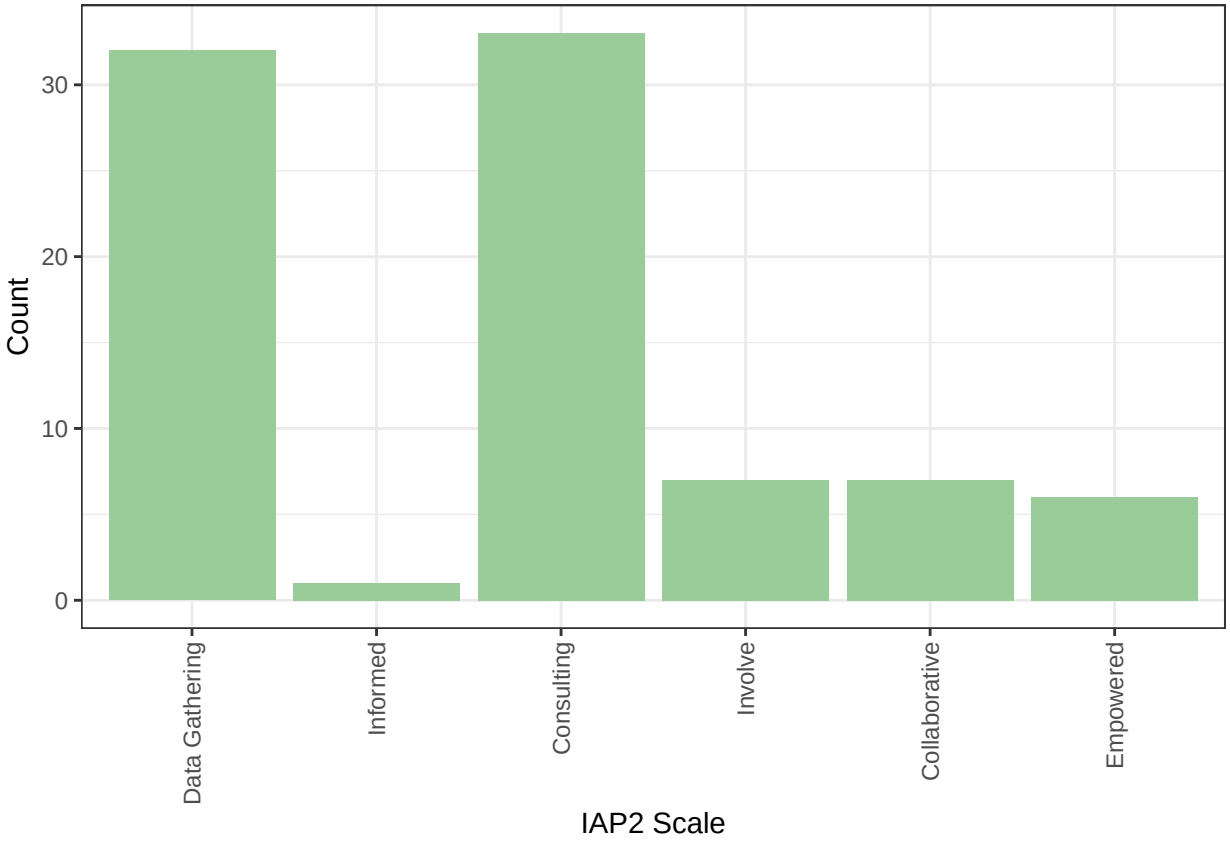
Stakeholder types



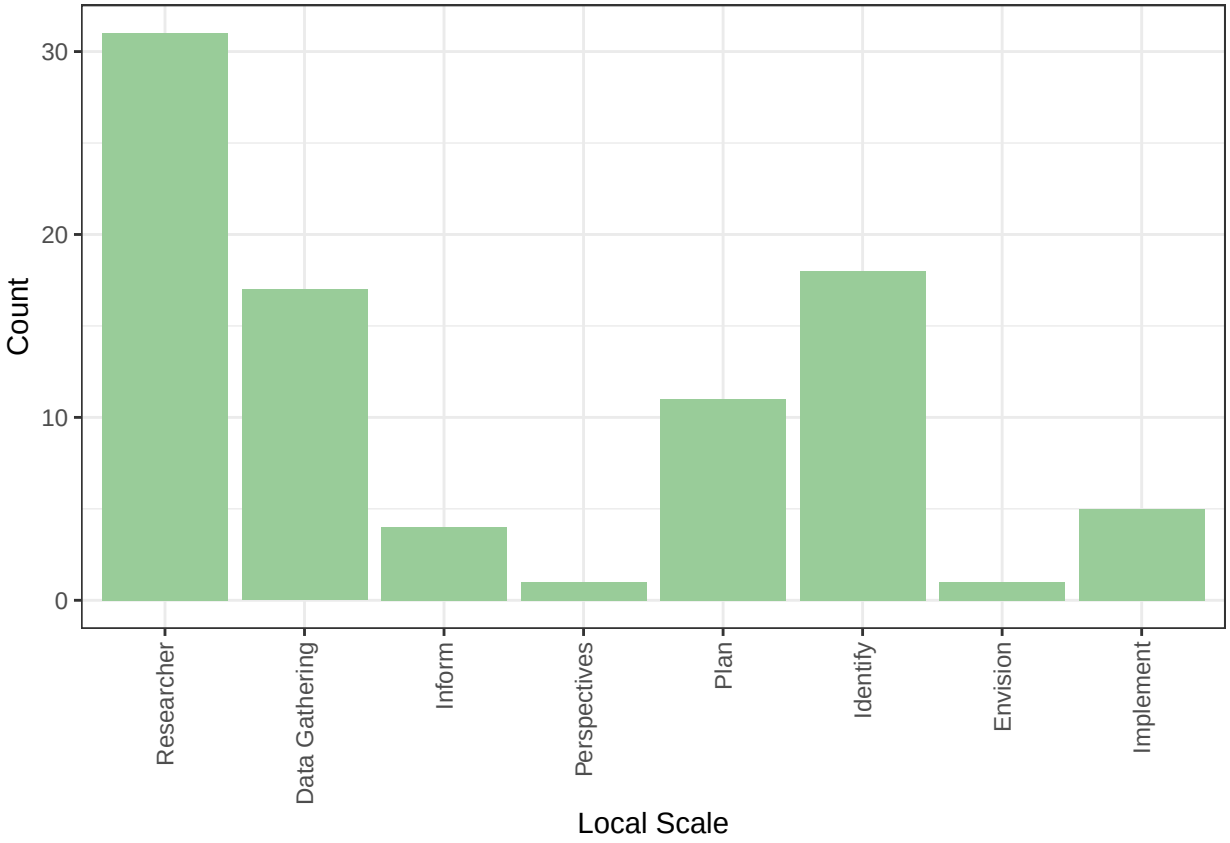
Ghodsvali scale breakdown



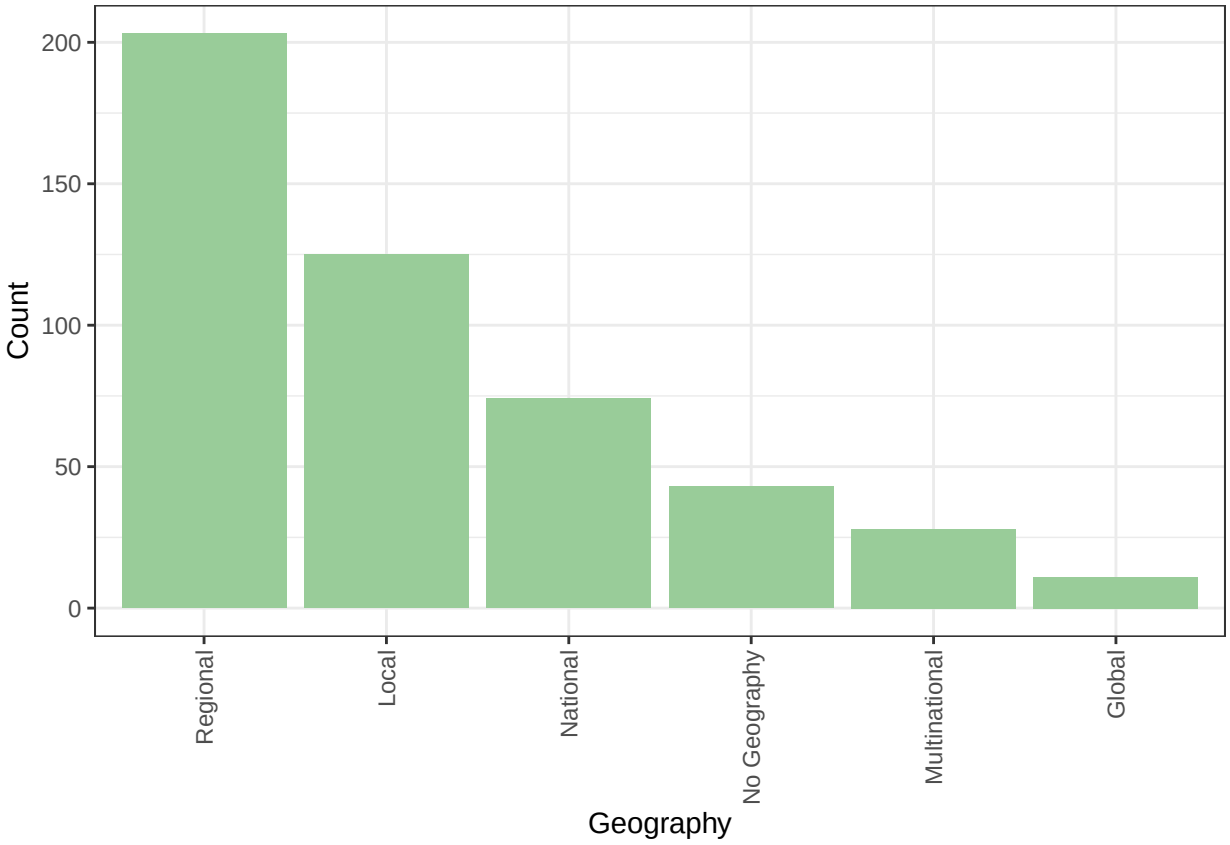
IAP2 scale breakdown



Local scale breakdown



Geographic location breakdown



Ghodsvali Scale Modeling - solution proposed

Ghodsvali scale regression

Ghodsvali scale regression testing on whether a solution was proposed or not

```
##
## Call:
## glm(formula = solution_proposed_YN ~ STE_G_nominal + STE_G_instrumental +
##     STE_G_representation + STE_G_transformative, family = binomial(link = "logit"),
##     data = crcdata)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.7344  -0.1423  -0.1423  -0.1423   3.0324
##
## Coefficients:
##                       Estimate Std. Error z value Pr(>|z|)
## (Intercept)           -4.5875     0.5025  -9.129  < 2e-16 ***
## STE_G_nominal          1.2917     1.1356   1.137  0.25535
## STE_G_instrumental     2.1308     0.7839   2.718  0.00656 **
## STE_G_representation   3.6067     0.8431   4.278 1.89e-05 ***
## STE_G_transformative   5.8403     0.9463   6.172 6.74e-10 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 153.748  on 482  degrees of freedom
## Residual deviance:  96.785  on 478  degrees of freedom
## AIC: 106.79
##
## Number of Fisher Scoring iterations: 7
```

Ghodsvali scale odds

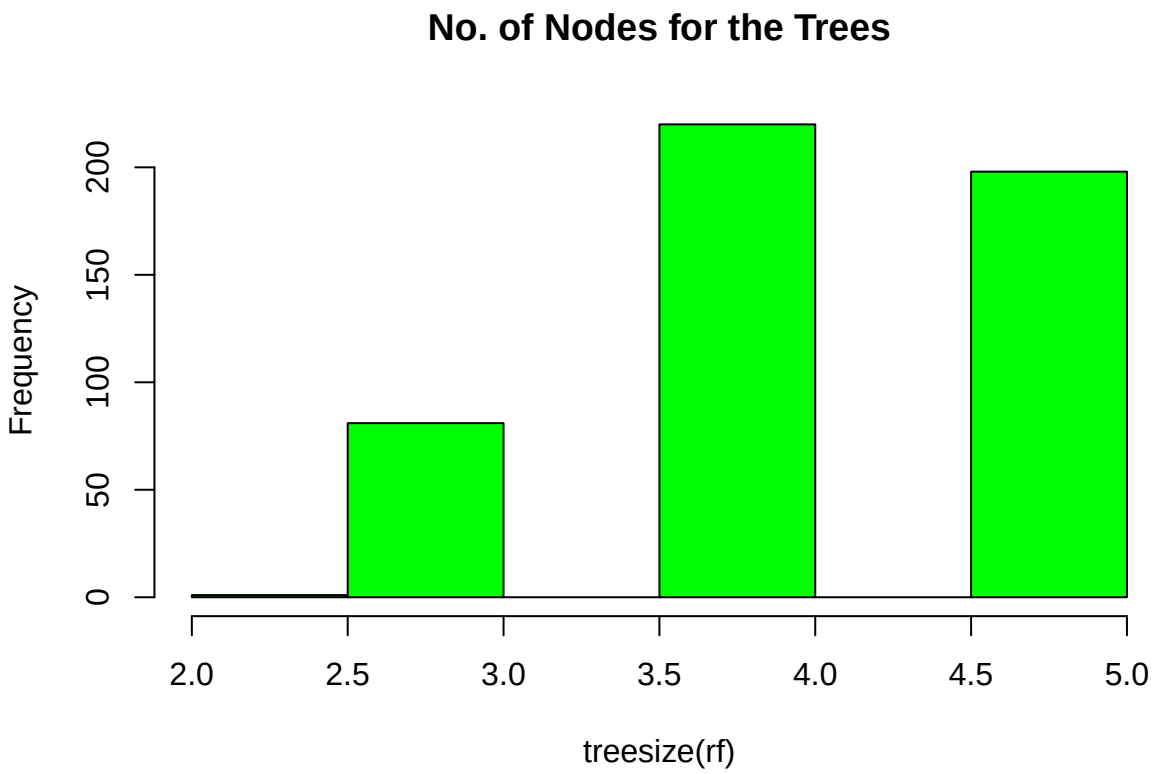
Odds of Ghodsvali scale predicting whether a solution was proposed or not

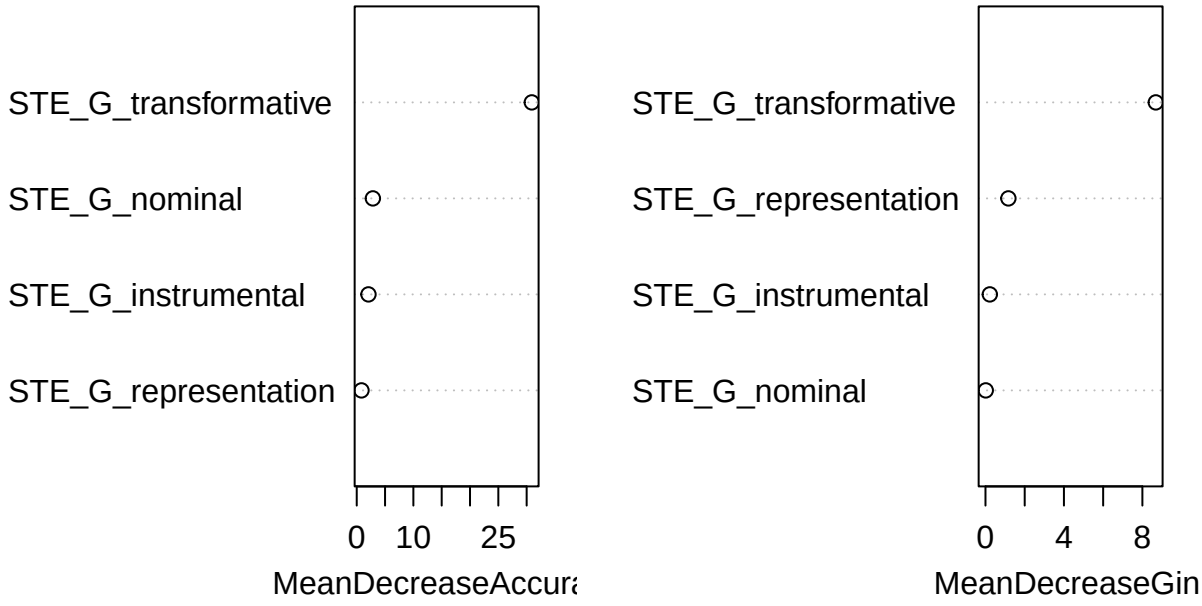
```
##
## Logistic regression predicting solution_proposed_YN : Y vs N
##
##                               crude OR(95%CI)        adj. OR(95%CI)
## STE_G_nominal: 1 vs 0         0.95 (0.12,7.44)       3.64 (0.39,33.7)
##
## STE_G_instrumental: 1 vs 0    2.46 (0.68,8.9)        8.42 (1.81,39.14)
##
## STE_G_representation: 1 vs 0  11.42 (2.75,47.41)     36.84 (7.06,192.33)
##
## STE_G_transformative: 1 vs 0  147.32 (27.42,791.53)  343.87 (53.82,2197.12)
##
##                               P(Wald's test) P(LR-test)
## STE_G_nominal: 1 vs 0         0.255          0.318
##
## STE_G_instrumental: 1 vs 0    0.007          0.015
##
## STE_G_representation: 1 vs 0  < 0.001        < 0.001
##
## STE_G_transformative: 1 vs 0  < 0.001        < 0.001
##
## Log-likelihood = -48.3926
## No. of observations = 483
## AIC value = 106.7851
```

Ghodsvali Ensembled Decision Tree with Feature Importance

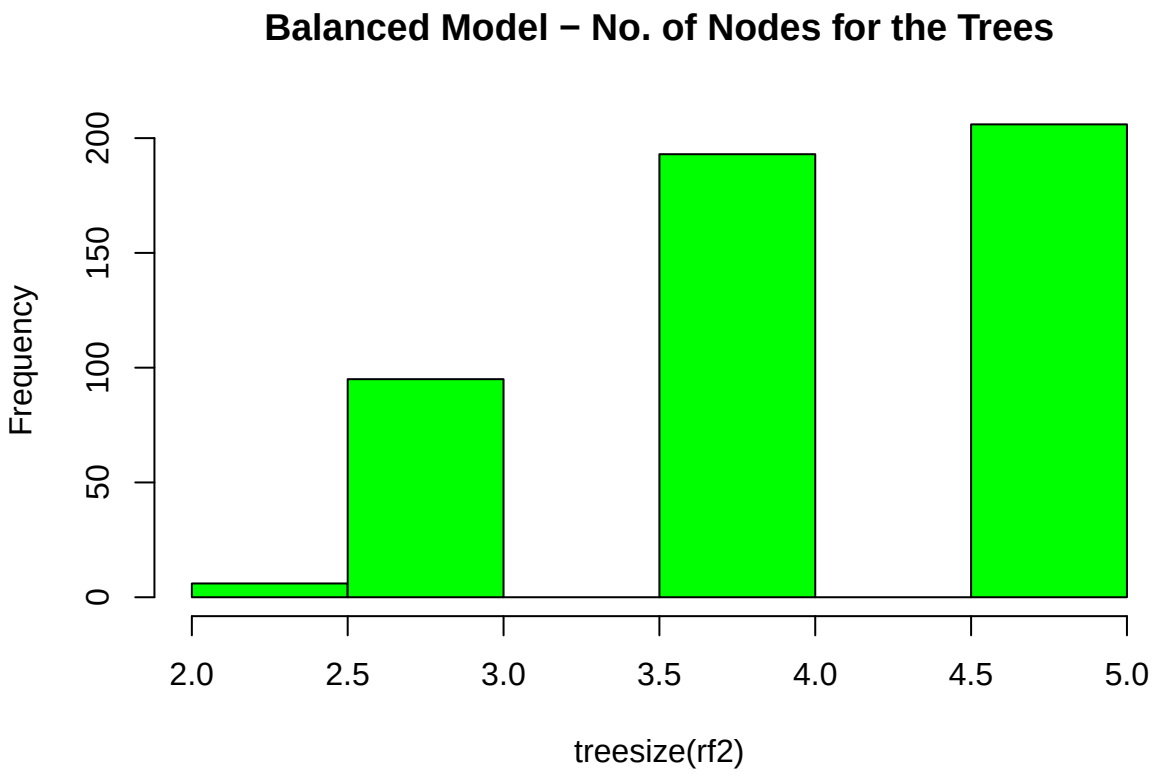
Ghodsvali ensembled decision tree with solution proposed being the dependent variable

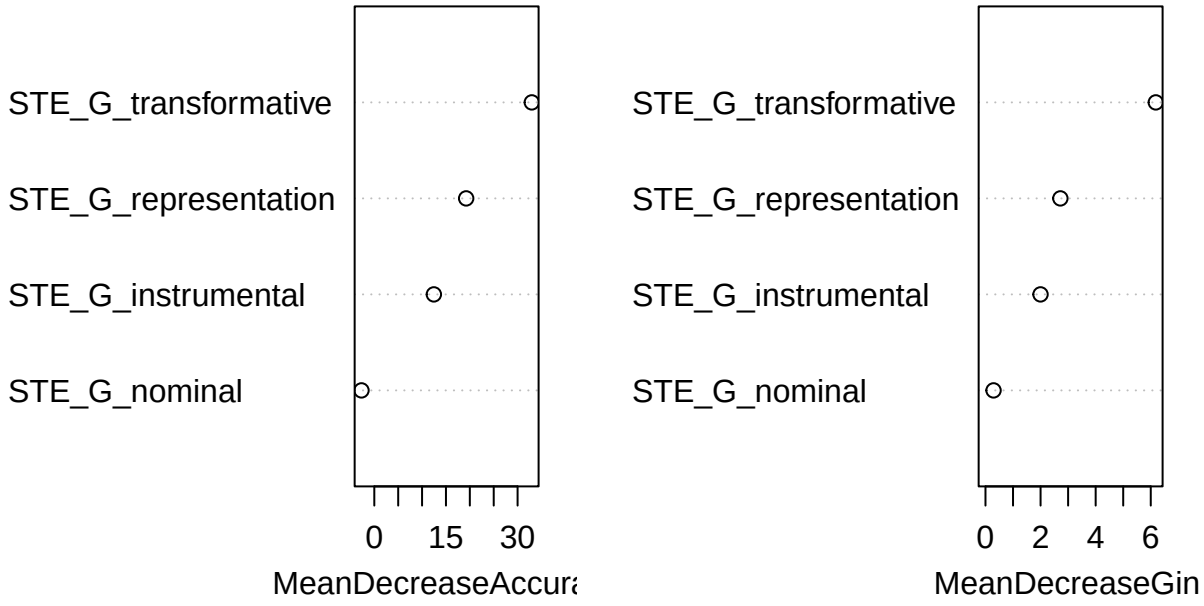
```
##
## Call:
##  randomForest(formula = solution_proposed_YN ~ STE_G_nominal +      STE_G_instrumental + STE_G_repres
##                Type of random forest: classification
##                      Number of trees: 500
## No. of variables tried at each split: 2
##
##         OOB estimate of  error rate: 2.12%
## Confusion matrix:
##     N Y class.error
## N 318 0   0.0000000
## Y   7 5   0.5833333

## Confusion Matrix and Statistics
##
##           Reference
## Prediction   N   Y
##          N 145   4
##          Y   2   2
##
##                Accuracy : 0.9608
##                  95% CI : (0.9166, 0.9855)
##     No Information Rate : 0.9608
##     P-Value [Acc > NIR] : 0.6063
##
##                   Kappa : 0.3806
##
##  Mcnemar's Test P-Value : 0.6831
##
##             Sensitivity : 0.9864
##             Specificity : 0.3333
##          Pos Pred Value : 0.9732
##          Neg Pred Value : 0.5000
##              Prevalence : 0.9608
##          Detection Rate : 0.9477
##    Detection Prevalence : 0.9739
##       Balanced Accuracy : 0.6599
##
##        'Positive' Class : N
##
```


No. of Nodes for the Trees
Frequency
0
50
100
150
200
2.0
2.5
3.0
3.5
4.0
4.5
5.0
treesize(rf)




```
##                                N         Y MeanDecreaseAccuracy MeanDecreaseGini
## STE_G_nominal          0.0000000  2.610176            2.8495061       0.01407228
## STE_G_instrumental    -2.4603017  3.518427            2.0722870       0.22160713
## STE_G_representation  -0.3495235  1.599972            0.8395988       1.16878564
## STE_G_transformative  30.2772886 32.843860           30.9050689       8.68365750
```


Balanced Model − No. of Nodes for the Trees
Frequency
0
50
100
150
200
2.0
2.5
3.0
3.5
4.0
4.5
5.0
treesize(rf2)




```
##                              N          Y MeanDecreaseAccuracy MeanDecreaseGini
## STE_G_nominal        -4.957544 -0.1790065            -2.688289        0.2926826
## STE_G_instrumental    8.696975 13.8188555            12.467863        1.9981127
## STE_G_representation 16.249477 19.0386826            19.232328        2.7188545
## STE_G_transformative 28.787395 32.8793212            32.972638        6.1828841
```

IAP2 Scale Modeling - solution proposed

IAP2 scale regression

IAP2 scale regression testing on whether a solution was proposed or not

```
##
## Call:
## glm(formula = solution_proposed_YN ~ STE_IAP2_data_gathering +
##     STE_IAP2_inform + STE_IAP2_consult + STE_IAP2_involve + STE_IAP2_collab +
##     STE_IAP2_empower, family = binomial(link = "logit"), data = crcdata)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.0579  -0.1423  -0.1423  -0.1423   3.0324
##
## Coefficients:
##                           Estimate Std. Error z value Pr(>|z|)
## (Intercept)               -4.5875     0.5025  -9.129  < 2e-16 ***
## STE_IAP2_data_gathering    1.1535     1.1335   1.018  0.30883
## STE_IAP2_inform          -12.9786  3956.1804  -0.003  0.99738
## STE_IAP2_consult           2.2849     0.7869   2.904  0.00369 **
## STE_IAP2_involve           2.7958     1.1913   2.347  0.01894 *
## STE_IAP2_collab            4.2998     0.9143   4.703 2.56e-06 ***
## STE_IAP2_empower          22.1536  1615.1039   0.014  0.98906
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 153.748  on 482  degrees of freedom
## Residual deviance:  89.049  on 476  degrees of freedom
## AIC: 103.05
##
## Number of Fisher Scoring iterations: 16
```

IAP2 scale odds

Odds of IAP2 scale predicting whether a solution was proposed or not

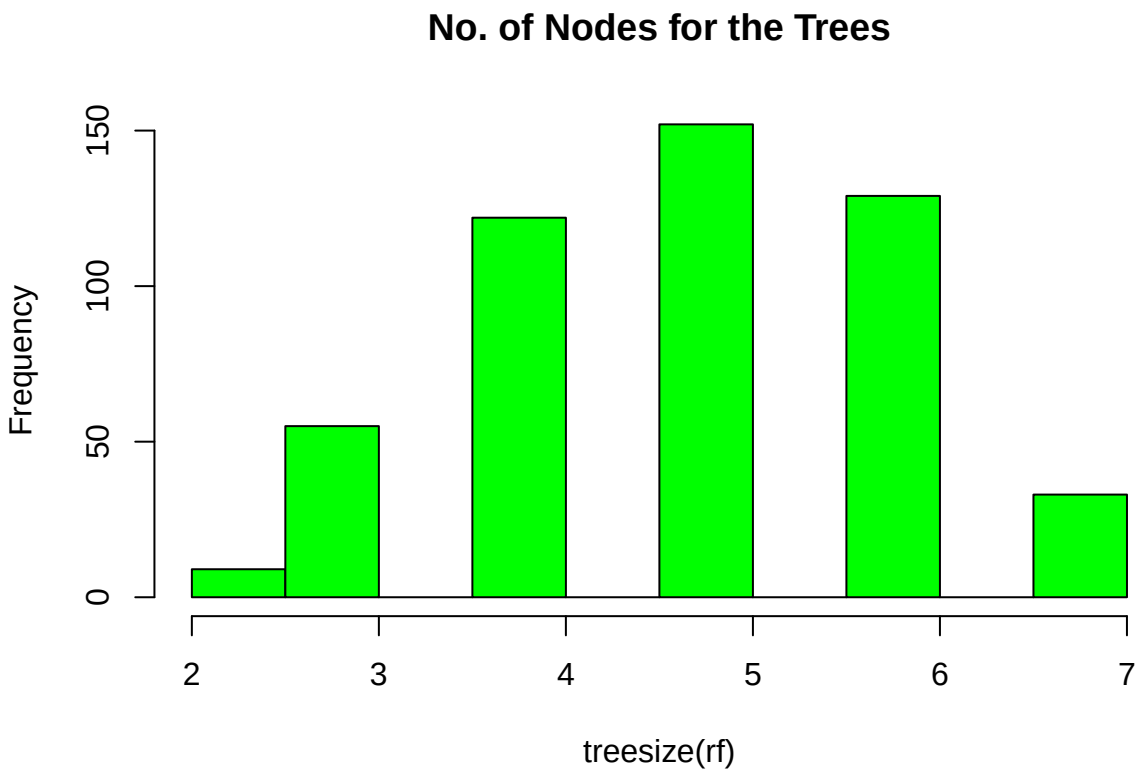
```
##
## Logistic regression predicting solution_proposed_YN : Y vs N
##
##                                  crude OR(95%CI)       adj. OR(95%CI)
## STE_IAP2_data_gathering: 1 vs 0  0.82 (0.11,6.39)      3.17 (0.34,29.23)
##
## STE_IAP2_inform: 1 vs 0          0 (0,Inf)             0 (0,Inf)
##
## STE_IAP2_consult: 1 vs 0         2.9 (0.8,10.57)       9.82 (2.1,45.93)
##
## STE_IAP2_involve: 1 vs 0         4.5 (0.51,39.48)      16.37 (1.59,169.13)
##
## STE_IAP2_collab: 1 vs 0          23.05 (4.73,112.22)   73.69 (12.28,442.2)
##
## STE_IAP2_empower: 1 vs 0         1648611478.8 (0,Inf)  4180027810.8 (0,Inf)
##
##                                  P(Wald's test) P(LR-test)
## STE_IAP2_data_gathering: 1 vs 0  0.309          0.365
##
## STE_IAP2_inform: 1 vs 0          0.997          0.887
##
## STE_IAP2_consult: 1 vs 0         0.004          0.01
##
## STE_IAP2_involve: 1 vs 0         0.019          0.066
##
## STE_IAP2_collab: 1 vs 0          < 0.001        < 0.001
##
## STE_IAP2_empower: 1 vs 0         0.989          < 0.001
##
## Log-likelihood = -44.5245
## No. of observations = 483
## AIC value = 103.0489
```

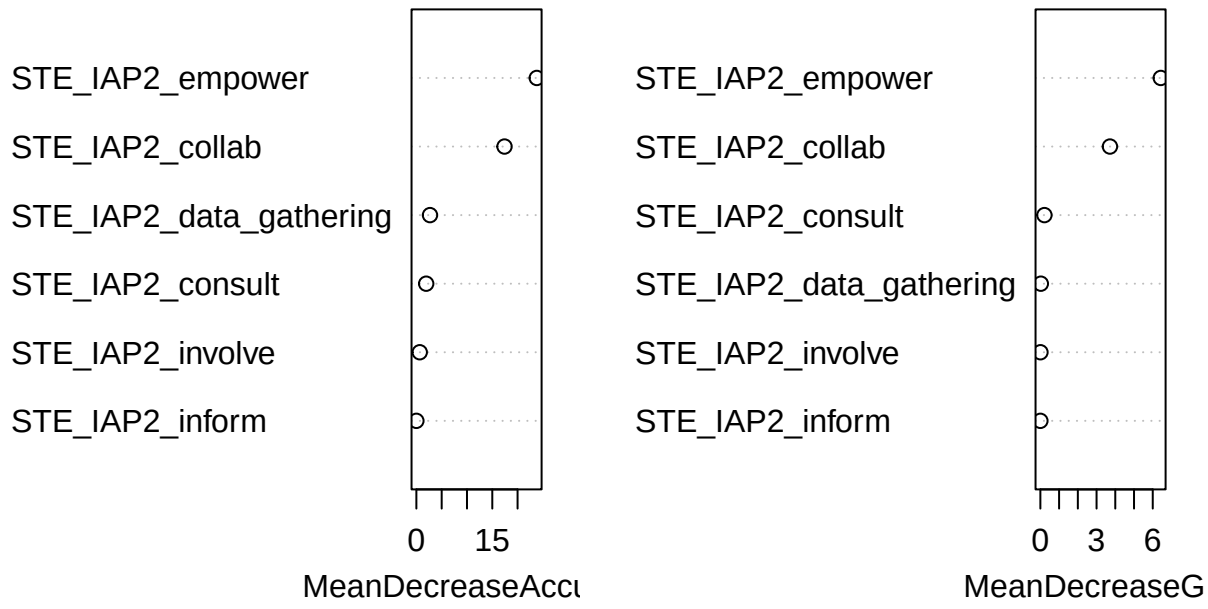
IAP2 Ensembled Decision Tree with Feature Importance

IAP2 ensembled decision tree with solution proposed being the dependent variable

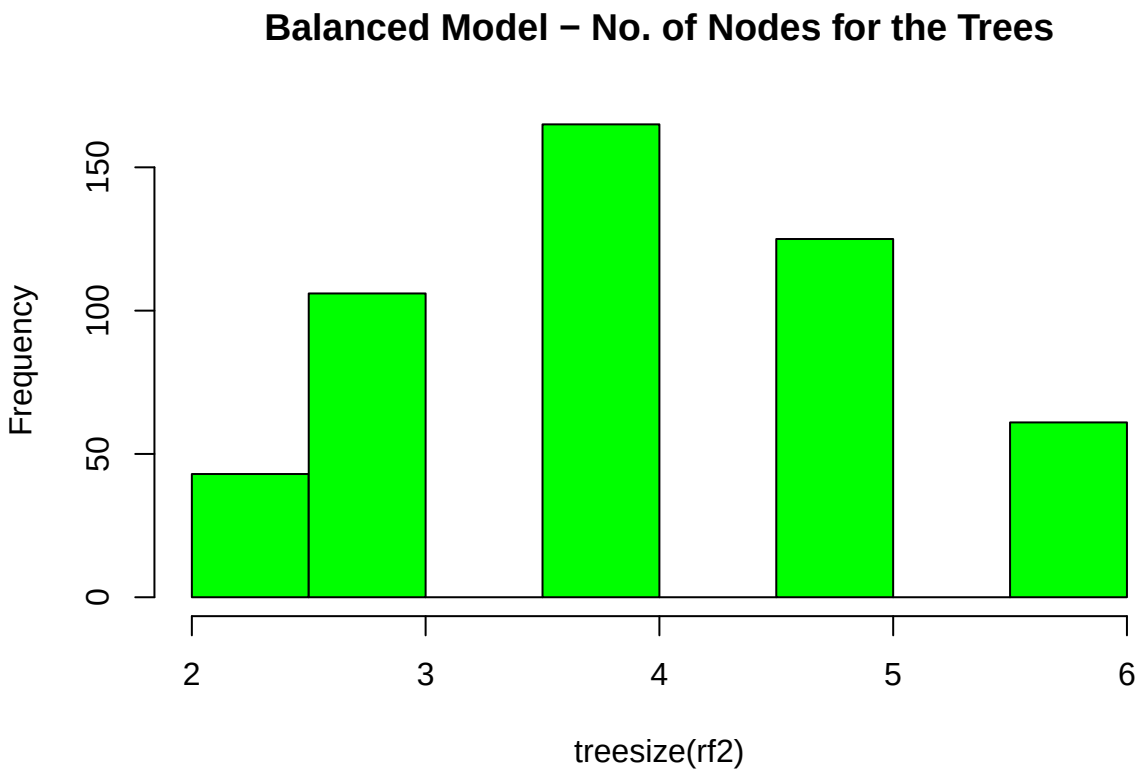
```
##
## Call:
##  randomForest(formula = solution_proposed_YN ~ STE_IAP2_data_gathering +      STE_IAP2_inform + STE_
##                Type of random forest: classification
##                      Number of trees: 500
## No. of variables tried at each split: 2
##
##         OOB estimate of  error rate: 2.12%
## Confusion matrix:
##     N Y class.error
## N 317 1 0.003144654
## Y   6 6 0.500000000
```

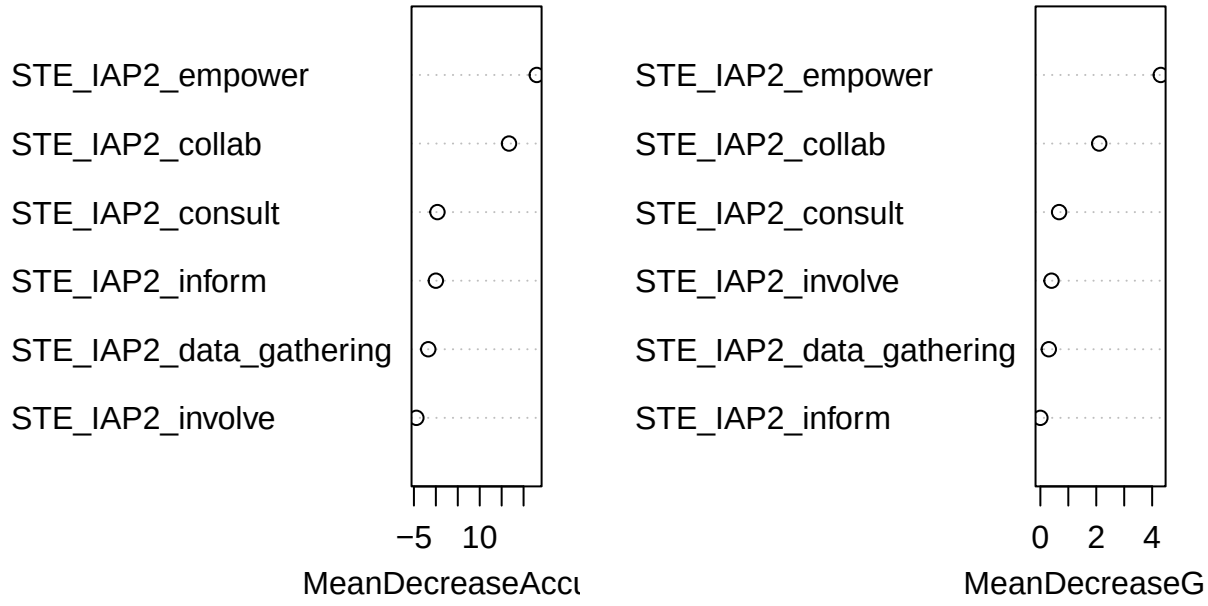
```
## Confusion Matrix and Statistics
##
##           Reference
## Prediction   N   Y
##          N 144   4
##          Y   3   2
##
##                Accuracy : 0.9542
##                  95% CI : (0.908, 0.9814)
##     No Information Rate : 0.9608
##     P-Value [Acc > NIR] : 0.7468
##
##                   Kappa : 0.3401
##
##  Mcnemar's Test P-Value : 1.0000
##
##             Sensitivity : 0.9796
##             Specificity : 0.3333
##          Pos Pred Value : 0.9730
##          Neg Pred Value : 0.4000
##              Prevalence : 0.9608
##          Detection Rate : 0.9412
##    Detection Prevalence : 0.9673
##       Balanced Accuracy : 0.6565
##
##        'Positive' Class : N
##
```


No. of Nodes for the Trees
Frequency
0
50
100
150
2
3
4
5
6
7
treesize(rf)




```
##                                N         Y MeanDecreaseAccuracy
## STE_IAP2_data_gathering -1.001002  2.968754            2.6915304
## STE_IAP2_inform          0.000000  0.000000            0.0000000
## STE_IAP2_consult        -2.246167  3.226454            1.9423953
## STE_IAP2_involve        -1.001002  1.402752            0.6673684
## STE_IAP2_collab         16.803483 16.348136           17.4131866
## STE_IAP2_empower        23.278986 23.945825           23.7934009
##                         MeanDecreaseGini
## STE_IAP2_data_gathering     0.0247202925
## STE_IAP2_inform             0.0005284155
## STE_IAP2_consult            0.2165674661
## STE_IAP2_involve            0.0046166709
## STE_IAP2_collab             3.7148569288
## STE_IAP2_empower            6.4287401842
```


Balanced Model − No. of Nodes for the Trees
Frequency
0
50
100
150
2
3
4
5
6
treesize(rf2)




```
##                                N         Y MeanDecreaseAccuracy
## STE_IAP2_data_gathering -4.805791  1.713496           -1.7277249
## STE_IAP2_inform          0.000000  0.000000            0.0000000
## STE_IAP2_consult        -2.973555  3.293621            0.3601168
## STE_IAP2_involve        -5.454418 -1.739820           -4.4428921
## STE_IAP2_collab         14.631236 16.367759           16.6772579
## STE_IAP2_empower        20.119536 23.000310           23.0092675
##                         MeanDecreaseGini
## STE_IAP2_data_gathering        0.3013502
## STE_IAP2_inform                0.0000000
## STE_IAP2_consult               0.6713571
## STE_IAP2_involve               0.3993555
## STE_IAP2_collab                2.1050361
## STE_IAP2_empower               4.3086310
```

Local Scale Modeling - solution proposed

Local scale regression

Local scale regression predicting whether a solution was proposed or not

```
##
## Call:
## glm(formula = solution_proposed_YN ~ SC_researcher + SC_datagathering +
##     SC_inform + SC_perspectives + SC_plan + SC_identify + SC_envision +
##     SC_implement, family = binomial(link = "logit"), data = crcdata)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.6729  -0.1552  -0.1552  -0.1552   3.0876
##
## Coefficients:
##                    Estimate Std. Error z value Pr(>|z|)
## (Intercept)         -4.4131     0.4571  -9.655  < 2e-16 ***
## SC_researcher       -0.3450     1.6328  -0.211    0.833
## SC_datagathering   -15.1350  2607.3229  -0.006    0.995
## SC_inform            4.4131     1.0995   4.014 5.98e-05 ***
## SC_perspectives    -15.1530 10754.0130  -0.001    0.999
## SC_plan            -15.1530  3242.4569  -0.005    0.996
## SC_identify          3.7199     0.6774   5.491 3.99e-08 ***
## SC_envision         23.9791 10754.0130   0.002    0.998
## SC_implement         5.8741     1.2436   4.723 2.32e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 153.748  on 482  degrees of freedom
## Residual deviance:  87.808  on 474  degrees of freedom
## AIC: 105.81
##
## Number of Fisher Scoring iterations: 18
```

Local scale odds

Odds of Local scale predicting whether a solution was proposed or not

```
##
## Logistic regression predicting solution_proposed_YN : Y vs N
##
##                            crude OR(95%CI)        adj. OR(95%CI)
## SC_researcher: 1 vs 0      0.85 (0.11,6.63)       0.71 (0.03,17.38)
##
## SC_datagathering: 1 vs 0   0 (0,Inf)              0 (0,Inf)
##
## SC_inform: 1 vs 0          28.94 (3.83,218.65)    82.52 (9.56,711.99)
##
## SC_perspectives: 1 vs 0    0 (0,Inf)              0 (0,Inf)
##
## SC_plan: 1 vs 0            0 (0,Inf)              0 (0,Inf)
##
## SC_identify: 1 vs 0        18.87 (6.06,58.74)     41.26 (10.94,155.66)
##
## SC_envision: 1 vs 0        157493116.45 (0,Inf)   25942087197.62 (0,Inf)
##
## SC_implement: 1 vs 0       132.57 (13.9,1263.96)  355.7 (31.08,4070.47)
##
##                            P(Wald's test) P(LR-test)
## SC_researcher: 1 vs 0      0.833          0.828
##
## SC_datagathering: 1 vs 0   0.995          0.53
##
## SC_inform: 1 vs 0          < 0.001        < 0.001
##
## SC_perspectives: 1 vs 0    0.999          0.877
##
## SC_plan: 1 vs 0            0.996          0.609
##
## SC_identify: 1 vs 0        < 0.001        < 0.001
##
## SC_envision: 1 vs 0        0.998          0.003
##
## SC_implement: 1 vs 0       < 0.001        < 0.001
##
## Log-likelihood = -43.9038
## No. of observations = 483
## AIC value = 105.8077
```

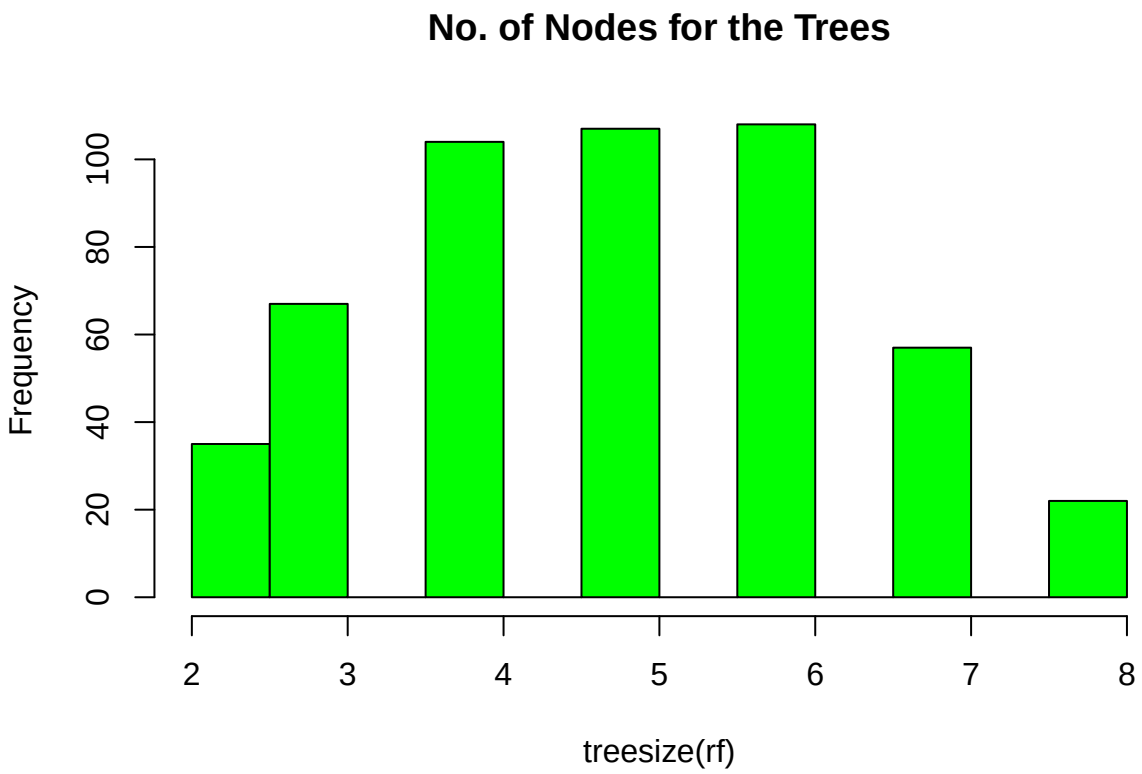
Local scale Ensembled Decision Tree with Feature Importance

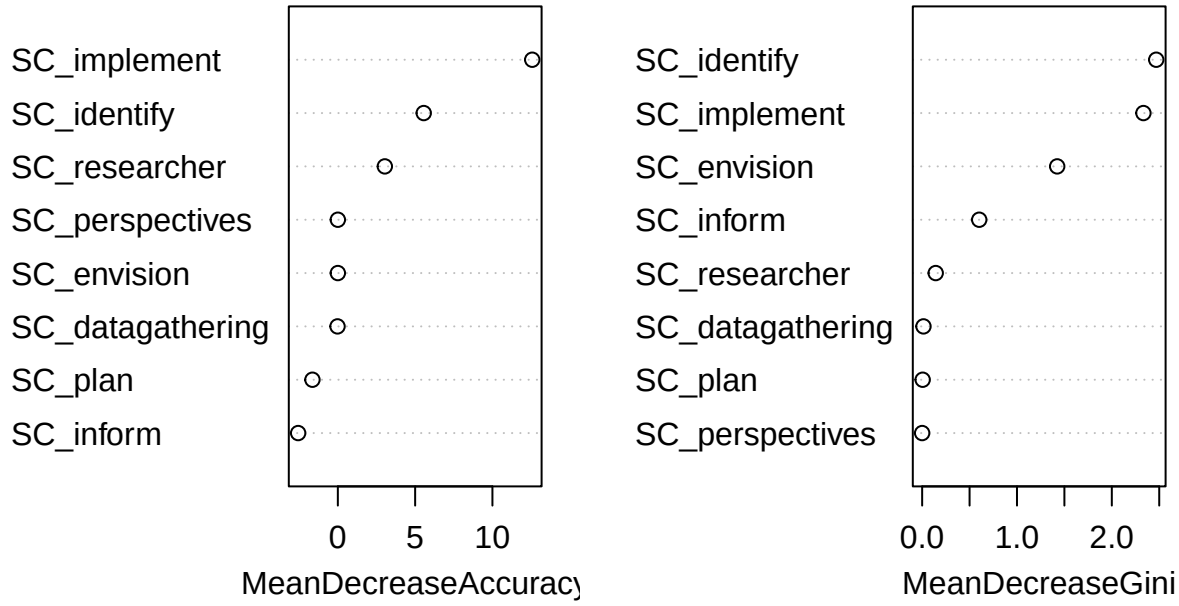
Local scale ensembled decision tree with solution proposed being the dependent variable

```
##
## Call:
##  randomForest(formula = solution_proposed_YN ~ SC_researcher +      SC_datagathering + SC_inform + SC
##                Type of random forest: classification
```

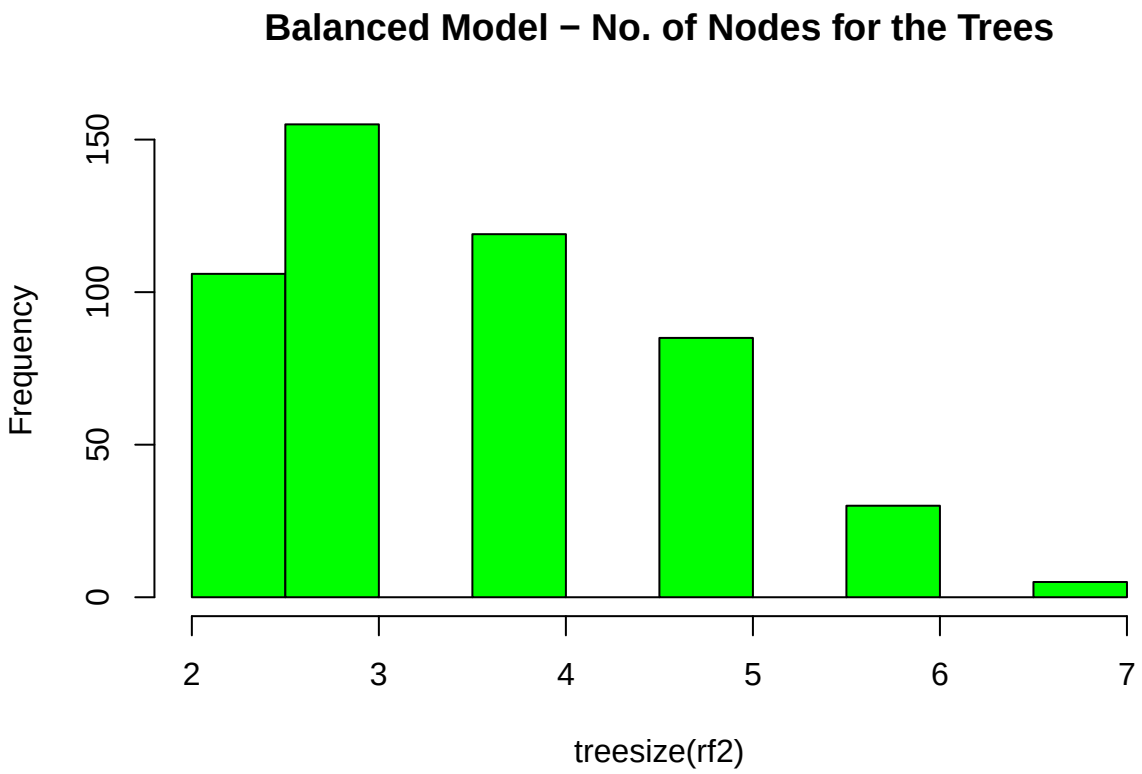
```
##                       Number of trees: 500
## No. of variables tried at each split: 2
##
##         OOB estimate of  error rate: 3.64%
## Confusion matrix:
##     N Y class.error
## N 318 0           0
## Y  12 0           1
```

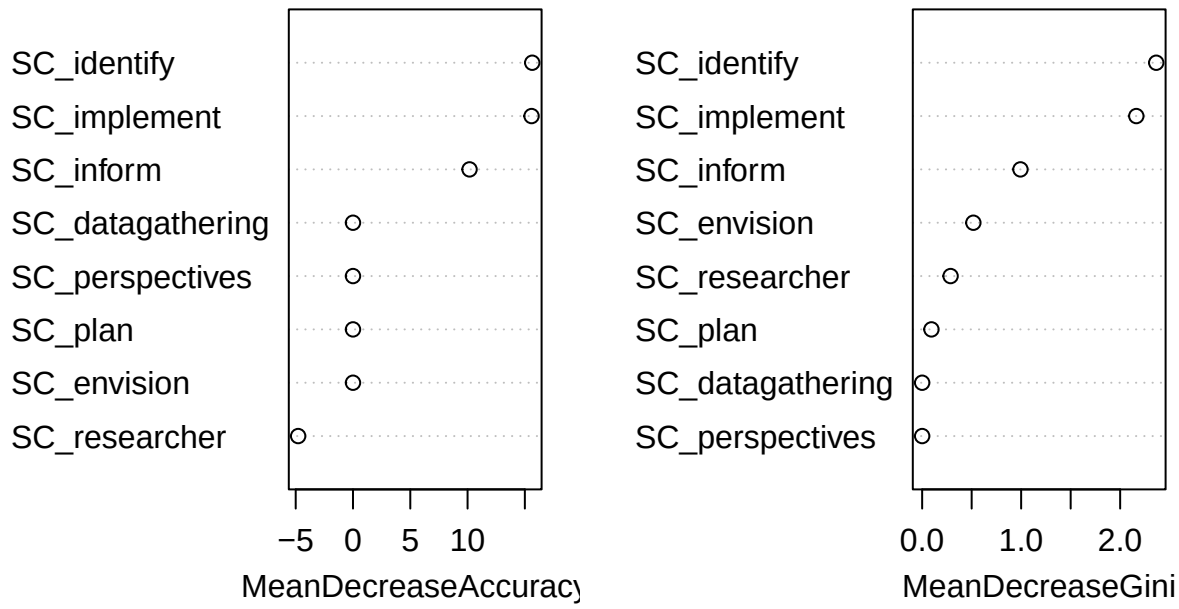
```
## Confusion Matrix and Statistics
##
##           Reference
## Prediction   N   Y
##          N 147   4
##          Y   0   2
##
##                Accuracy : 0.9739
##                  95% CI : (0.9344, 0.9928)
##     No Information Rate : 0.9608
##     P-Value [Acc > NIR] : 0.2797
##
##                   Kappa : 0.49
##
##  Mcnemar's Test P-Value : 0.1336
##
##             Sensitivity : 1.0000
##             Specificity : 0.3333
##          Pos Pred Value : 0.9735
##          Neg Pred Value : 1.0000
##              Prevalence : 0.9608
##          Detection Rate : 0.9608
##    Detection Prevalence : 0.9869
##       Balanced Accuracy : 0.6667
##
##        'Positive' Class : N
##
```


No. of Nodes for the Trees
Frequency
0
20
40
60
80
100
2
3
4
5
6
7
8
treesize(rf)




```
##                          N         Y MeanDecreaseAccuracy MeanDecreaseGini
## SC_researcher     2.809446  1.402752           3.03842698      0.142906691
## SC_datagathering -1.735218  1.737270          -0.02161838      0.013885878
## SC_inform        -2.662617 -1.001002          -2.56728924      0.601859958
## SC_perspectives   0.000000  0.000000           0.00000000      0.000000000
## SC_plan          -1.647633  0.000000          -1.64405008      0.005209153
## SC_identify       4.961773  5.630388           5.55570358      2.468431058
## SC_envision       0.000000  0.000000           0.00000000      1.423916717
## SC_implement     12.065468 11.441803          12.57511031      2.333062142
```


Balanced Model − No. of Nodes for the Trees
Frequency
0
50
100
150
2
3
4
5
6
7
treesize(rf2)




```
##                          N         Y MeanDecreaseAccuracy MeanDecreaseGini
## SC_researcher    -5.167449 -3.410037            -4.784933        0.2870373
## SC_datagathering  0.000000  0.000000             0.000000        0.0000000
## SC_inform         8.654443 10.182698            10.171643        0.9928456
## SC_perspectives   0.000000  0.000000             0.000000        0.0000000
## SC_plan           0.000000  0.000000             0.000000        0.0937960
## SC_identify      13.946800 15.965453            15.643268        2.3644649
## SC_envision       0.000000  0.000000             0.000000        0.5171342
## SC_implement     14.666792 15.275532            15.583971        2.1632648
```

Stakeholder Engagement Modeling - solution proposed

Regression Testing - Engagement vs. solution

Regression of whether stakeholder engagement (Y/N) predicts if a solution was proposed (Y/N)

```
##
## Call:
## glm(formula = solution_proposed_YN ~ S_stakeholder_engagment_YN,
##     family = binomial, data = crcdata)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -0.5746  -0.1434  -0.1434  -0.1434   3.0274
##
## Coefficients:
##                              Estimate Std. Error z value Pr(>|z|)
## (Intercept)                   -4.5721     0.5026  -9.097  < 2e-16 ***
## S_stakeholder_engagment_YNY    2.8545     0.5804   4.918 8.73e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 153.75  on 482  degrees of freedom
## Residual deviance: 123.09  on 481  degrees of freedom
## AIC: 127.09
##
## Number of Fisher Scoring iterations: 7
```

Odds Ratio - Engagement vs. solution

Odds of whether stakeholder engagement (Y/N) predicts if a solution was proposed (Y/N)

```
##
## Logistic regression predicting solution_proposed_YN : Y vs N
##
##                                    OR(95%CI)           P(Wald's test)
## S_stakeholder_engagment_YN: Y vs N 17.37 (5.57,54.16)  < 0.001
##
##                                    P(LR-test)
## S_stakeholder_engagment_YN: Y vs N < 0.001
##
## Log-likelihood = -61.5436
## No. of observations = 483
## AIC value = 127.0872
```

Compuational Model used Modeling - solution proposed

Regression Testing - Use of computational model vs. solution

Regression of whether a computational model was used predicts if a solution was proposed (Y/N)

```
##
## Call:
## glm(formula = solution_proposed_YN ~ S_model_YN, family = binomial,
##     data = crcdata)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -0.3203  -0.2628  -0.2628  -0.2628   2.6012
##
## Coefficients:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept)  -3.3486     0.2822  -11.87   <2e-16 ***
## S_model_YNN   0.4041     0.5387    0.75    0.453
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 153.75  on 482  degrees of freedom
## Residual deviance: 153.22  on 481  degrees of freedom
## AIC: 157.22
##
## Number of Fisher Scoring iterations: 6
```

Odds Ratios - Use of computational model vs. solution

Odds of whether a computational model was used predicts if a solution was proposed (Y/N)

```
##
## Logistic regression predicting solution_proposed_YN : Y vs N
##
##                     OR(95%CI)        P(Wald's test) P(LR-test)
## S_model_YN: N vs Y 1.5 (0.52,4.31)  0.453          0.466
##
## Log-likelihood = -76.6085
## No. of observations = 483
## AIC value = 157.2169
```

Ghodsvali Modeling - Computational Model

Regression Testing - Ghodsvali vs whether a computational model was used

Regression testing for Ghodsvali scale used to predict if a computational model was used (Y/N)

```
##
## Call:
## glm(formula = S_model_YN ~ STE_G_nominal + STE_G_instrumental +
##     STE_G_representation + STE_G_transformative, family = binomial,
##     data = crcdata)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.1010  -0.6567  -0.6567  -0.5863   1.9214
##
## Coefficients:
##                       Estimate Std. Error z value Pr(>|z|)
## (Intercept)           -1.4245     0.1269 -11.223   <2e-16 ***
## STE_G_nominal          0.6773     0.4241   1.597   0.1103
## STE_G_instrumental    -0.2495     0.4626  -0.539   0.5897
## STE_G_representation   1.2422     0.6187   2.008   0.0447 *
## STE_G_transformative   0.7314     0.7184   1.018   0.3087
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 492.67  on 482  degrees of freedom
## Residual deviance: 485.50  on 478  degrees of freedom
## AIC: 495.5
##
## Number of Fisher Scoring iterations: 4
```

Odds Ratio - Ghodsvali vs whether a computational model was used

Odds ratio for Ghodsvali scale used to predict if a computational model was used (Y/N)

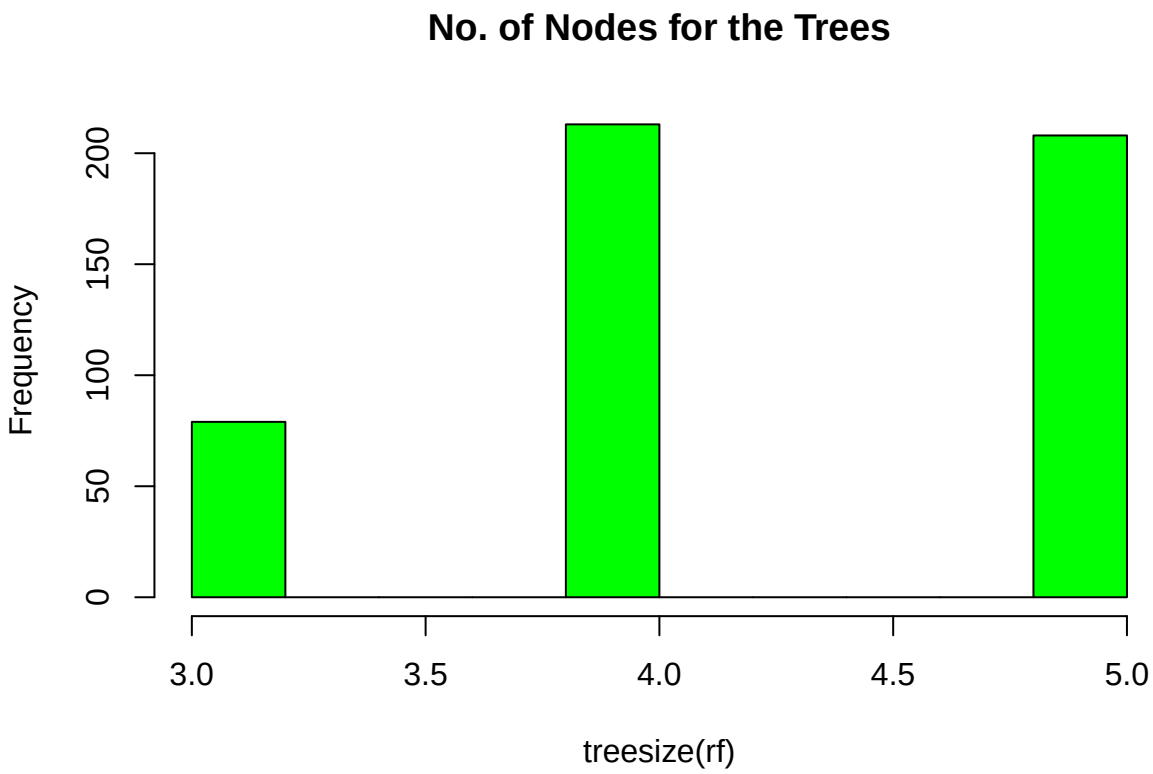
```
##
## Logistic regression predicting S_model_YN : N vs Y
##
##                               crude OR(95%CI)    adj. OR(95%CI)
## STE_G_nominal: 1 vs 0         1.89 (0.83,4.33)   1.97 (0.86,4.52)
##
## STE_G_instrumental: 1 vs 0    0.7 (0.28,1.72)    0.78 (0.31,1.93)
##
## STE_G_representation: 1 vs 0  3.31 (0.99,11.07)  3.46 (1.03,11.64)
##
## STE_G_transformative: 1 vs 0  1.94 (0.48,7.91)   2.08 (0.51,8.49)
##
##                               P(Wald's test) P(LR-test)
## STE_G_nominal: 1 vs 0         0.11           0.124
##
## STE_G_instrumental: 1 vs 0    0.59           0.581
##
## STE_G_representation: 1 vs 0  0.045          0.054
##
## STE_G_transformative: 1 vs 0  0.309          0.331
##
## Log-likelihood = -242.7512
## No. of observations = 483
## AIC value = 495.5025
```

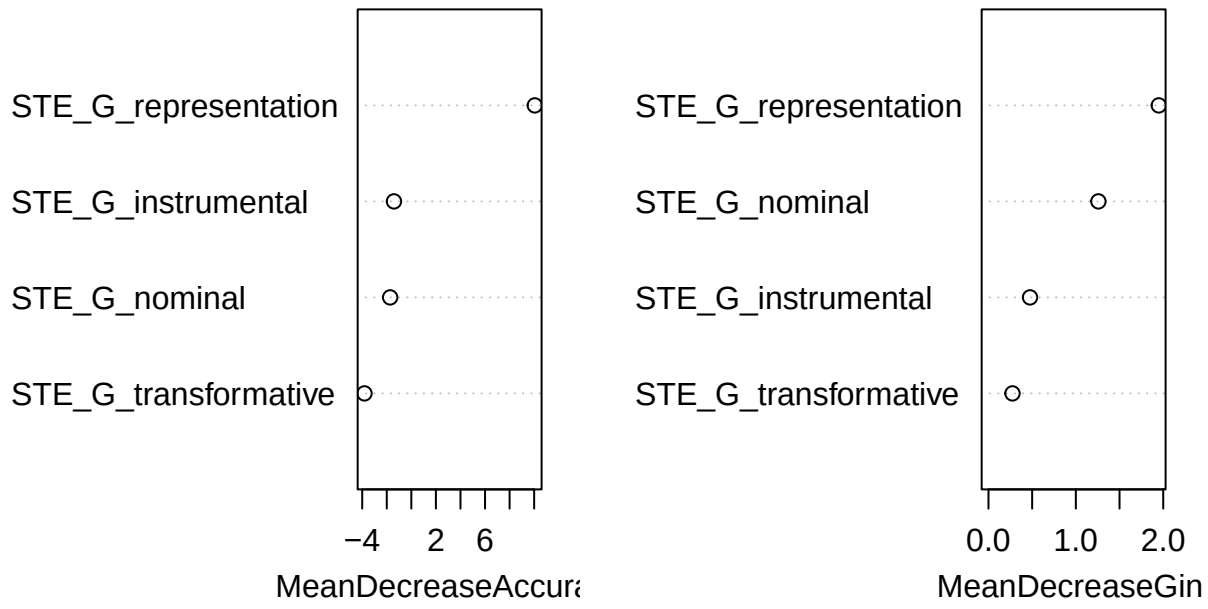
Ghodsvali Ensembled Decision Tree vs whether a computational model was used

Ensembled decision tree for Ghodsvali scale used to predict if a computational model was used (Y/N)

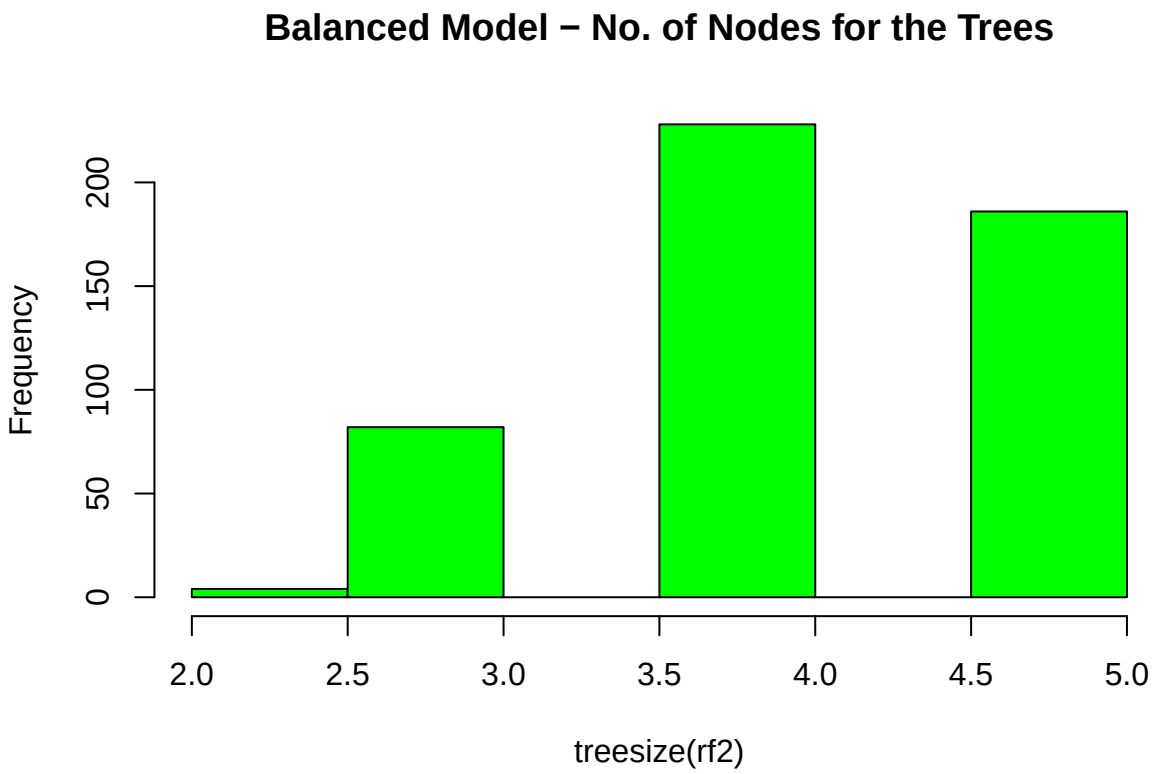
```
##
## Call:
##  randomForest(formula = S_model_YN ~ STE_G_nominal + STE_G_instrumental +      STE_G_representation +
##                Type of random forest: classification
##                      Number of trees: 500
## No. of variables tried at each split: 2
##
##         OOB estimate of  error rate: 22.73%
## Confusion matrix:
##     Y N class.error
## Y 255 3  0.01162791
## N  72 0  1.00000000
```

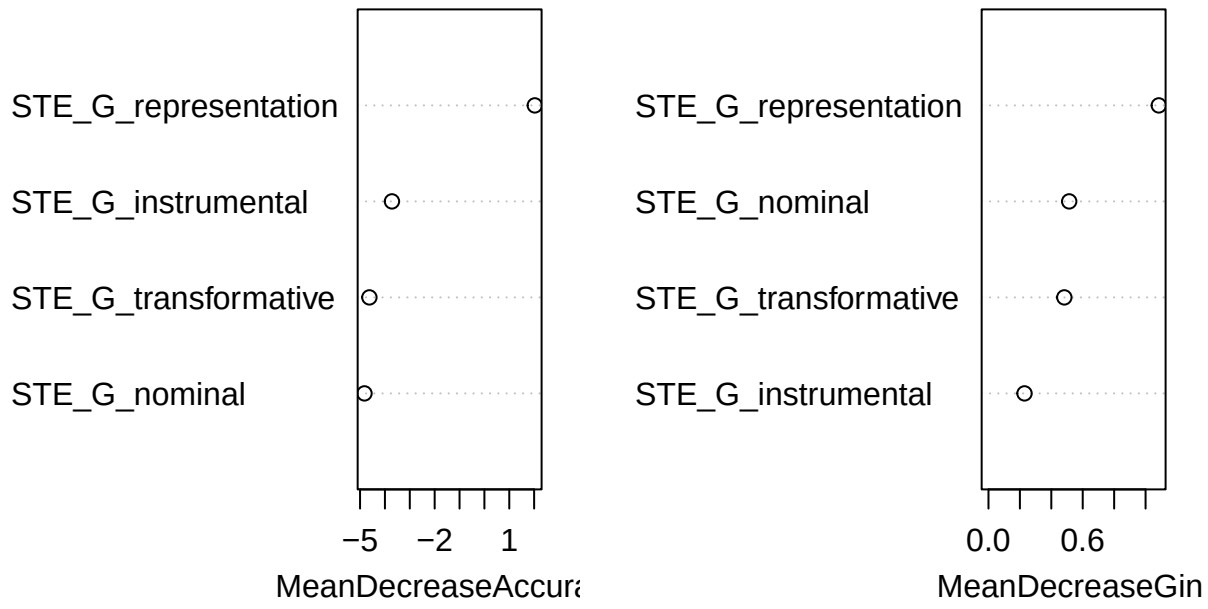
```
## Confusion Matrix and Statistics
##
##           Reference
## Prediction   N   Y
##          N   3   1
##          Y 144   5
##
##                Accuracy : 0.0523
##                  95% CI : (0.0228, 0.1004)
##     No Information Rate : 0.9608
##     P-Value [Acc > NIR] : 1
##
##                   Kappa : -0.0118
##
##  Mcnemar's Test P-Value : <2e-16
##
##             Sensitivity : 0.02041
##             Specificity : 0.83333
##          Pos Pred Value : 0.75000
##          Neg Pred Value : 0.03356
##              Prevalence : 0.96078
##          Detection Rate : 0.01961
##    Detection Prevalence : 0.02614
##       Balanced Accuracy : 0.42687
##
##        'Positive' Class : N
##
```


No. of Nodes for the Trees
Frequency
0
50
100
150
200
3.0
3.5
4.0
4.5
5.0
treesize(rf)




```
##                              Y          N MeanDecreaseAccuracy MeanDecreaseGini
## STE_G_nominal        -2.342688 -0.8916701            -1.725486        1.2581863
## STE_G_instrumental   -3.337346  2.6543333            -1.414937        0.4755925
## STE_G_representation  8.915036 10.7687925            10.050645        1.9493173
## STE_G_transformative -4.319413 -2.8281259            -3.815605        0.2747521
```


Balanced Model − No. of Nodes for the Trees
Frequency
0
50
100
150
200
2.0
2.5
3.0
3.5
4.0
4.5
5.0
treesize(rf2)




```
##                              Y         N MeanDecreaseAccuracy MeanDecreaseGini
## STE_G_nominal        -5.3453965 -2.611082            -4.822230        0.5138633
## STE_G_instrumental   -4.2897148 -2.486475            -3.718062        0.2292921
## STE_G_representation -0.4291241  3.763166             2.025896        1.0841650
## STE_G_transformative -4.7748839 -1.159885            -4.624345        0.4827570
```

IAP2 Modeling - Computational Model

Regression Testing - IAP2 vs whether a computational model was used

Regression testing for IAP2 scale used to predict if a computational model was used (Y/N)

```
##
## Call:
## glm(formula = S_model_YN ~ STE_IAP2_data_gathering + STE_IAP2_inform +
##     STE_IAP2_consult + STE_IAP2_involve + STE_IAP2_collab + STE_IAP2_empower,
##     family = binomial, data = crcdata)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.0579  -0.6567  -0.6567  -0.6567   1.8112
##
## Coefficients:
##                          Estimate Std. Error z value Pr(>|z|)
## (Intercept)               -1.4245     0.1269 -11.223   <2e-16 ***
## STE_IAP2_data_gathering    0.4862     0.4132   1.177    0.239
## STE_IAP2_inform          -12.1416   535.4112  -0.023    0.982
## STE_IAP2_consult           0.1123     0.4443   0.253    0.800
## STE_IAP2_involve           0.5082     0.8462   0.601    0.548
## STE_IAP2_collab            1.1368     0.7742   1.468    0.142
## STE_IAP2_empower           0.7314     0.8753   0.836    0.403
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 492.67  on 482  degrees of freedom
## Residual deviance: 488.28  on 476  degrees of freedom
## AIC: 502.28
##
## Number of Fisher Scoring iterations: 12
```

Odds Ratio - IAP2 vs whether a computational model was used

Odds ratio for IAP2 scale used to predict if a computational model was used (Y/N)

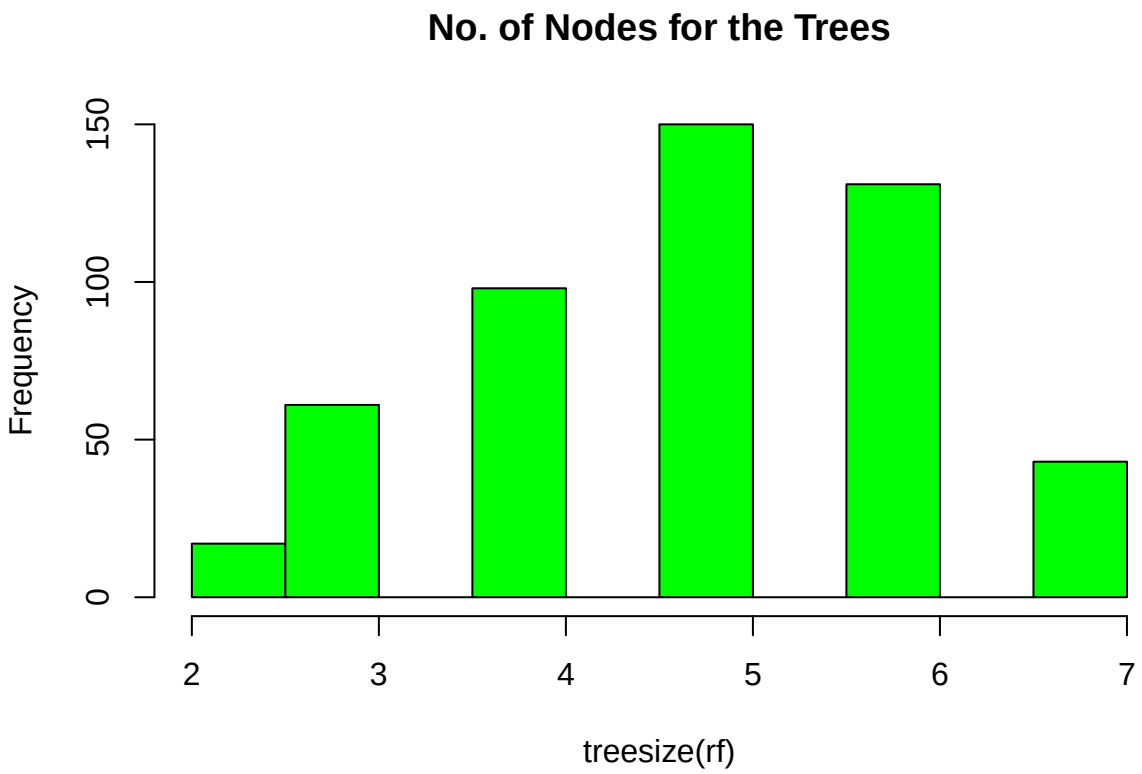
```
##
## Logistic regression predicting S_model_YN : N vs Y
##
##                                 crude OR(95%CI)    adj. OR(95%CI)
## STE_IAP2_data_gathering: 1 vs 0  1.55 (0.69,3.46)   1.63 (0.72,3.65)
##
## STE_IAP2_inform: 1 vs 0          0 (0,Inf)          0 (0,Inf)
##
## STE_IAP2_consult: 1 vs 0         1.03 (0.44,2.46)   1.12 (0.47,2.67)
##
## STE_IAP2_involve: 1 vs 0         1.54 (0.29,8.07)   1.66 (0.32,8.73)
##
## STE_IAP2_collab: 1 vs 0          2.93 (0.65,13.31)  3.12 (0.68,14.22)
##
## STE_IAP2_empower: 1 vs 0         1.93 (0.35,10.71)  2.08 (0.37,11.55)
##
##                                 P(Wald's test) P(LR-test)
## STE_IAP2_data_gathering: 1 vs 0  0.239          0.254
##
## STE_IAP2_inform: 1 vs 0          0.982          0.512
##
## STE_IAP2_consult: 1 vs 0         0.8            0.802
##
## STE_IAP2_involve: 1 vs 0         0.548          0.563
##
## STE_IAP2_collab: 1 vs 0          0.142          0.161
##
## STE_IAP2_empower: 1 vs 0         0.403          0.425
##
## Log-likelihood = -244.1393
## No. of observations = 483
## AIC value = 502.2787
```

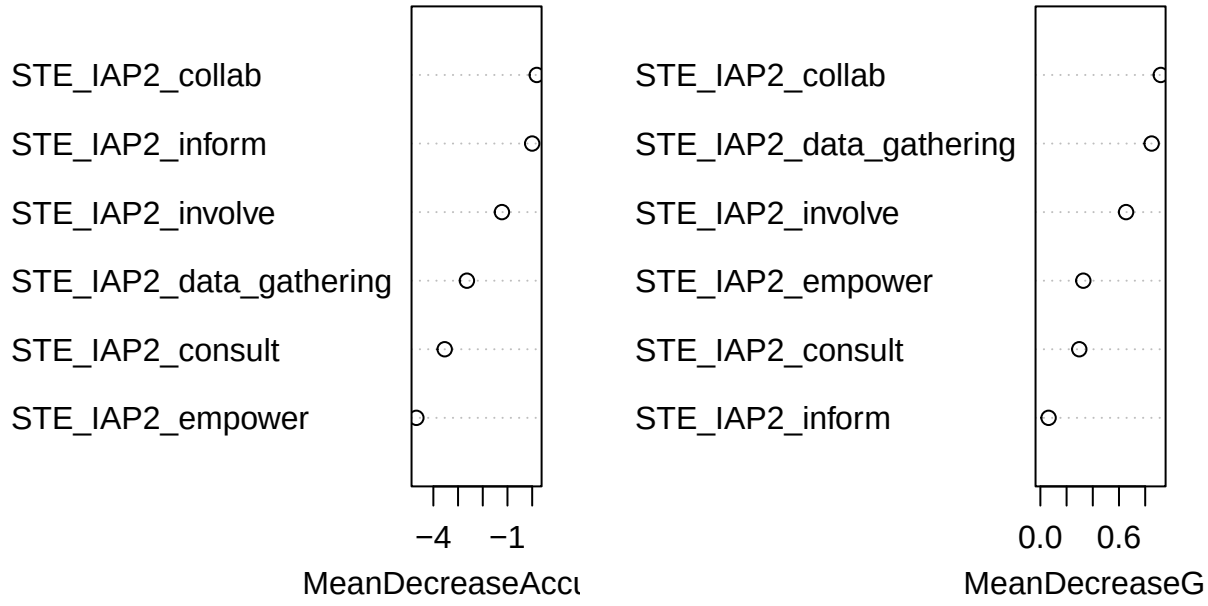
IAP2 Ensembled Decision Tree vs whether a computational model was used

Ensembled decision tree for IAP2 scale used to predict if a computational model was used (Y/N)

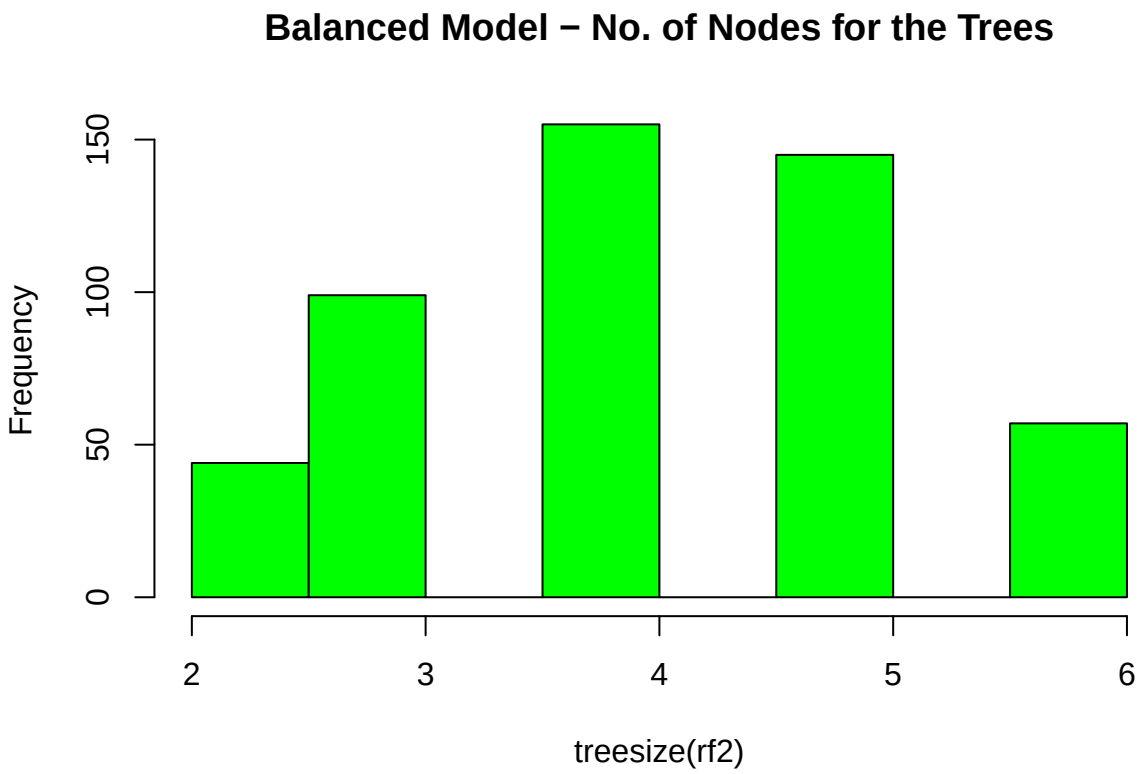
```
##
## Call:
##  randomForest(formula = S_model_YN ~ STE_IAP2_data_gathering +      STE_IAP2_inform + STE_IAP2_consul
##                Type of random forest: classification
##                      Number of trees: 500
## No. of variables tried at each split: 2
##
##         OOB estimate of  error rate: 22.42%
## Confusion matrix:
##     Y N class.error
## Y 256 2 0.007751938
## N  72 0 1.000000000
```

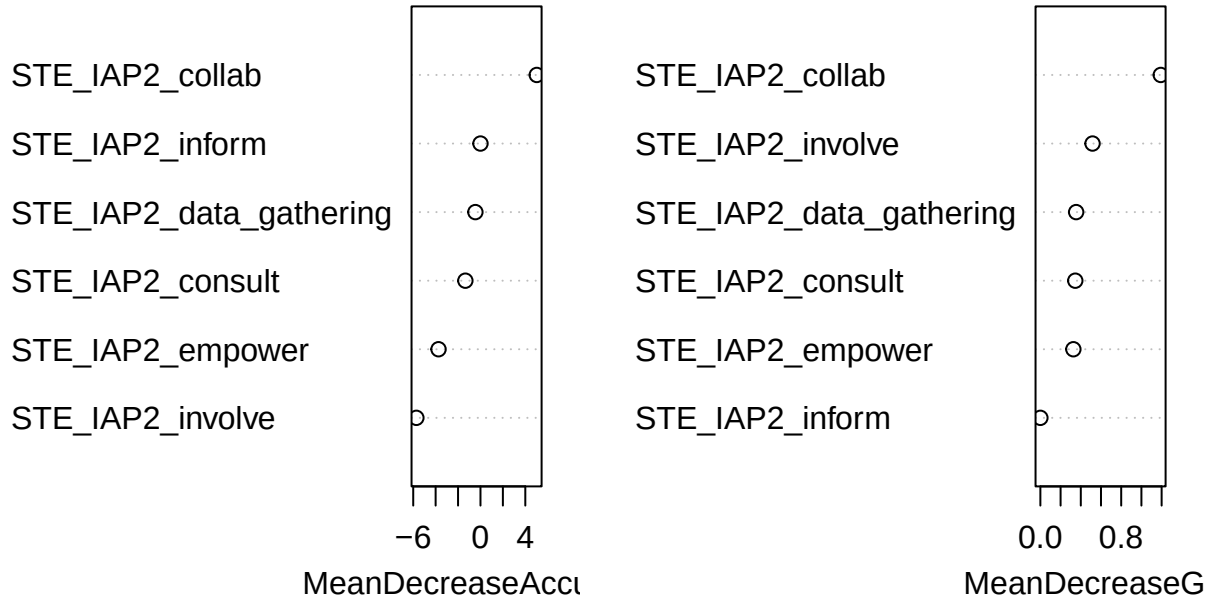
```
## Confusion Matrix and Statistics
##
##           Reference
## Prediction   N   Y
##          N   0   0
##          Y 147   6
##
##                Accuracy : 0.0392
##                  95% CI : (0.0145, 0.0834)
##     No Information Rate : 0.9608
##     P-Value [Acc > NIR] : 1
##
##                   Kappa : 0
##
##  Mcnemar's Test P-Value : <2e-16
##
##             Sensitivity : 0.00000
##             Specificity : 1.00000
##          Pos Pred Value :     NaN
##          Neg Pred Value : 0.03922
##              Prevalence : 0.96078
##          Detection Rate : 0.00000
##    Detection Prevalence : 0.00000
##       Balanced Accuracy : 0.50000
##
##        'Positive' Class : N
##
```


No. of Nodes for the Trees
Frequency
0
50
100
150
2
3
4
5
6
7
treesize(rf)




```
##                                Y           N MeanDecreaseAccuracy
## STE_IAP2_data_gathering -3.5623207 -0.99486321           -2.6417575
## STE_IAP2_inform          0.0000000  0.00000000            0.0000000
## STE_IAP2_consult        -3.9245636  1.00100150           -3.5413453
## STE_IAP2_involve        -2.3582057  0.07332614           -1.2242753
## STE_IAP2_collab         -0.9251694  1.31339717            0.1863176
## STE_IAP2_empower        -4.9604399 -4.17567429           -4.6872370
##                         MeanDecreaseGini
## STE_IAP2_data_gathering       0.84920374
## STE_IAP2_inform               0.06267541
## STE_IAP2_consult              0.29683920
## STE_IAP2_involve              0.65402431
## STE_IAP2_collab               0.91887768
## STE_IAP2_empower              0.32764696
```


Balanced Model − No. of Nodes for the Trees
Frequency
0
50
100
150
2
3
4
5
6
treesize(rf2)




```
##                                Y         N MeanDecreaseAccuracy
## STE_IAP2_data_gathering -2.428395  2.018065           -0.4543501
## STE_IAP2_inform          0.000000  0.000000            0.0000000
## STE_IAP2_consult        -2.651759  1.671316           -1.3477080
## STE_IAP2_involve        -5.931382 -4.692241           -5.7192841
## STE_IAP2_collab          3.627823  5.540887            5.0246431
## STE_IAP2_empower        -4.432875 -2.617909           -3.7427957
##                         MeanDecreaseGini
## STE_IAP2_data_gathering        0.3542815
## STE_IAP2_inform                0.0000000
## STE_IAP2_consult               0.3456048
## STE_IAP2_involve               0.5163276
## STE_IAP2_collab                1.1916679
## STE_IAP2_empower               0.3265557
```

Local Modeling - Computational Model

Regression Testing - Local scale vs whether a computational model was used

Regression testing for Local scale used to predict if a computational model was used (Y/N)

```
##
## Call:
## glm(formula = S_model_YN ~ SC_researcher + SC_datagathering +
##     SC_inform + SC_perspectives + SC_plan + SC_identify + SC_envision +
##     SC_implement, family = binomial, data = crcdata)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.1010  -0.6552  -0.6552  -0.6552   1.8134
##
## Coefficients:
##                  Estimate Std. Error z value Pr(>|z|)
## (Intercept)       -1.4295     0.1268 -11.276   <2e-16 ***
## SC_researcher      0.1496     0.4496   0.333   0.7393
## SC_datagathering   0.2417     0.5848   0.413   0.6793
## SC_inform          0.3309     1.1616   0.285   0.7758
## SC_perspectives   15.9956   882.7434   0.018   0.9855
## SC_plan            1.2472     0.6187   2.016   0.0438 *
## SC_identify        0.1767     0.5809   0.304   0.7609
## SC_envision      -13.1366   882.7434  -0.015   0.9881
## SC_implement       0.9938     0.9233   1.076   0.2818
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 492.67  on 482  degrees of freedom
## Residual deviance: 484.07  on 474  degrees of freedom
## AIC: 502.07
##
## Number of Fisher Scoring iterations: 13
```

Odds Ratio - Local scale vs whether a computational model was used

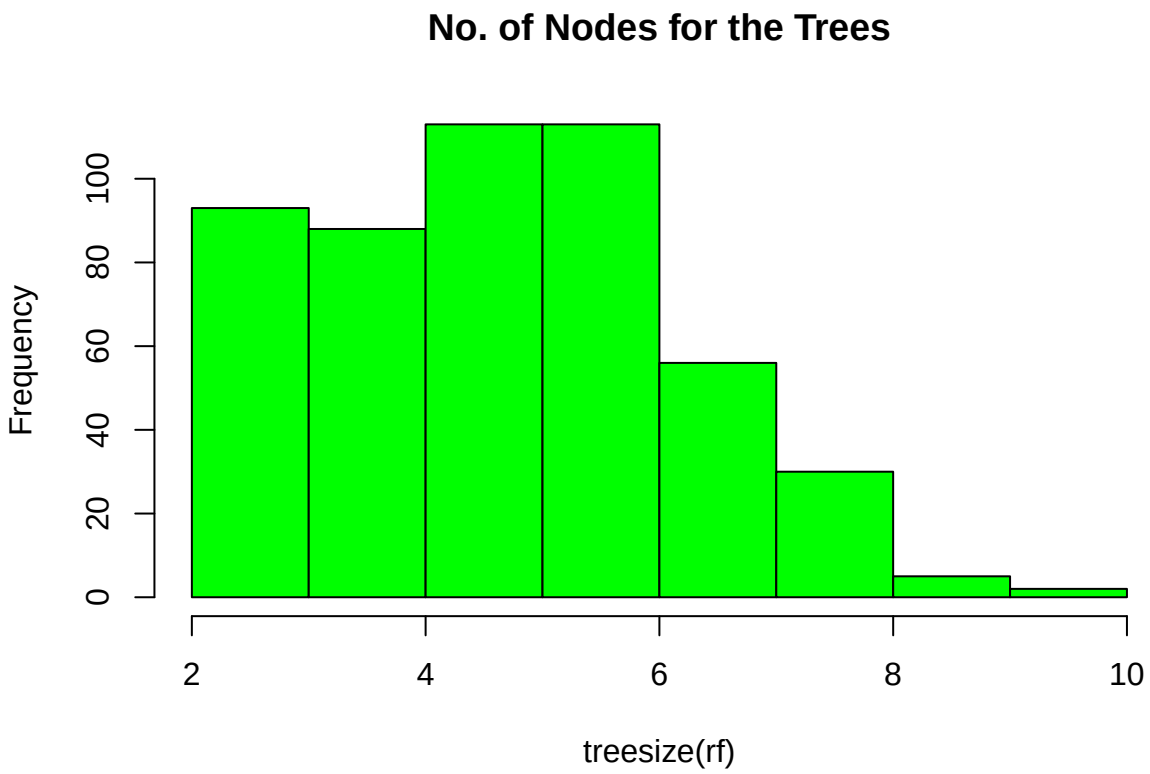
Odds ratio for Local scale used to predict if a computational model was used (Y/N)

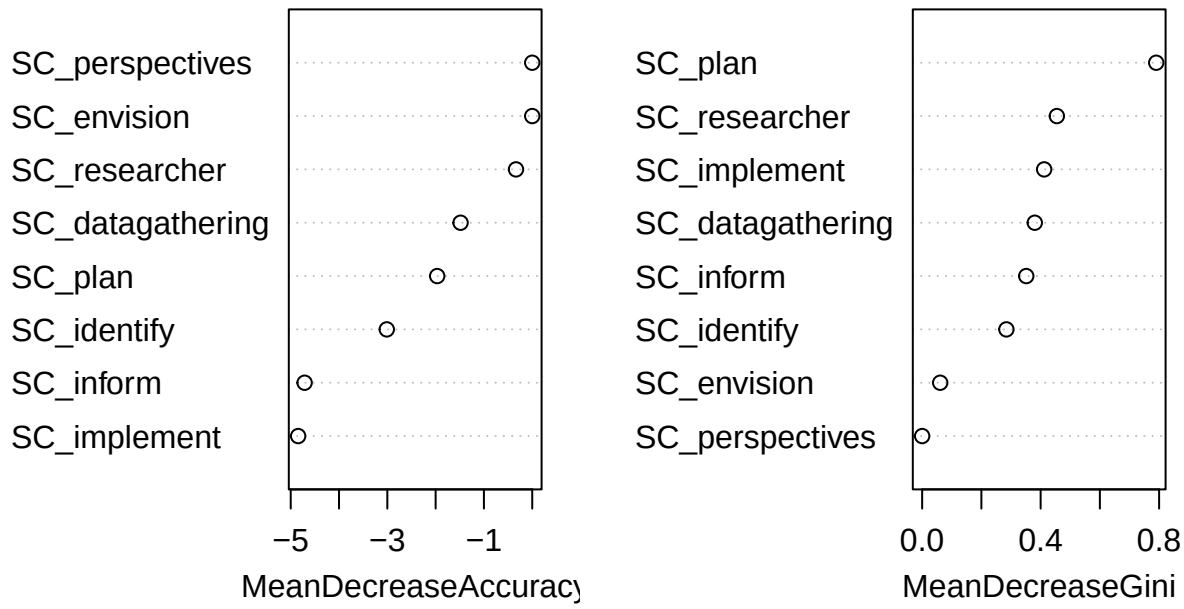
```
##
## Logistic regression predicting S_model_YN : N vs Y
##
##                            crude OR(95%CI)     adj. OR(95%CI)     P(Wald's test)
## SC_researcher: 1 vs 0      1.13 (0.47,2.69)    1.16 (0.48,2.8)    0.739
##
## SC_datagathering: 1 vs 0   1.19 (0.38,3.72)    1.27 (0.4,4.01)    0.679
##
## SC_inform: 1 vs 0          1.28 (0.13,12.43)   1.39 (0.14,13.57)  0.776
##
## SC_perspectives: 1 vs 0    3014611.83 (0,Inf)  8846904.7 (0,Inf)  0.986
##
## SC_plan: 1 vs 0            3.31 (0.99,11.07)   3.48 (1.04,11.7)   0.044
##
## SC_identify: 1 vs 0        1.1 (0.35,3.41)     1.19 (0.38,3.73)   0.761
##
## SC_envision: 1 vs 0        0 (0,Inf)           0 (0,Inf)          0.988
##
## SC_implement: 1 vs 0       2.59 (0.43,15.68)   2.7 (0.44,16.5)    0.282
##
##                            P(LR-test)
## SC_researcher: 1 vs 0      0.742
##
## SC_datagathering: 1 vs 0   0.685
##
## SC_inform: 1 vs 0          0.782
##
## SC_perspectives: 1 vs 0    0.07
##
## SC_plan: 1 vs 0            0.053
##
## SC_identify: 1 vs 0        0.764
##
## SC_envision: 1 vs 0        0.513
##
## SC_implement: 1 vs 0       0.305
##
## Log-likelihood = -242.0351
## No. of observations = 483
## AIC value = 502.0701
```

Localscale Ensembled Decision Tree vs whether a computational model was used

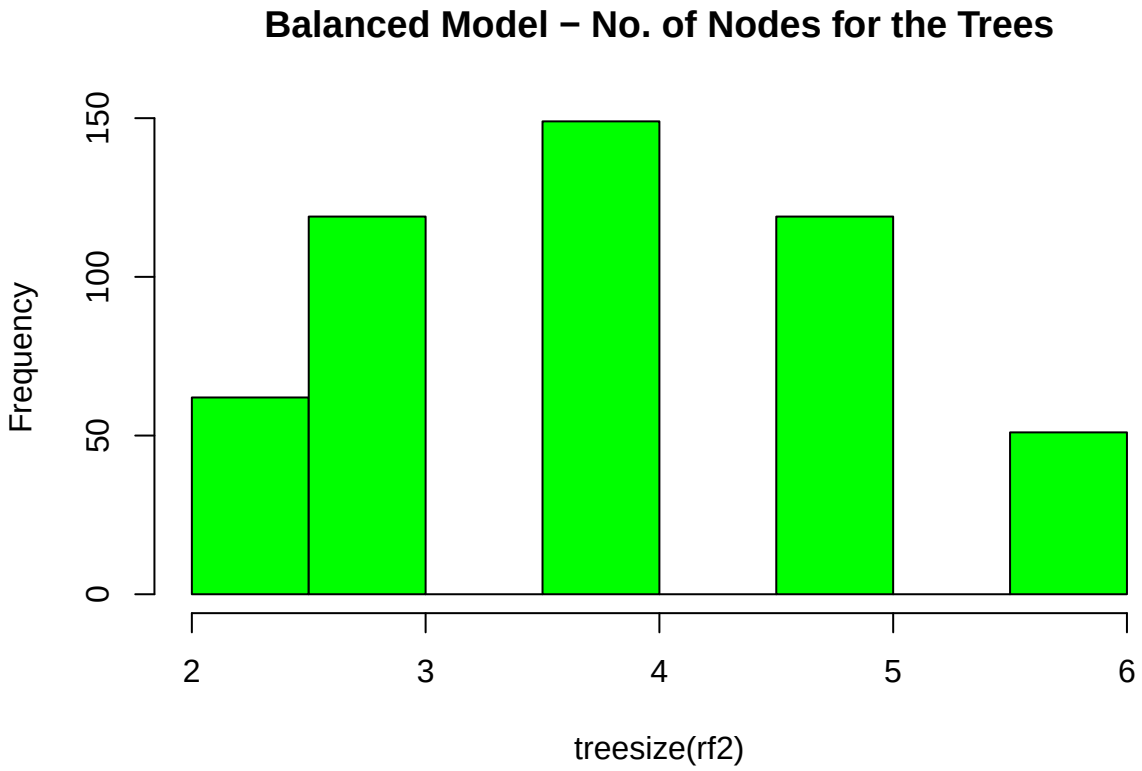
Ensembled decision tree for Local scale used to predict if a computational model was used (Y/N)

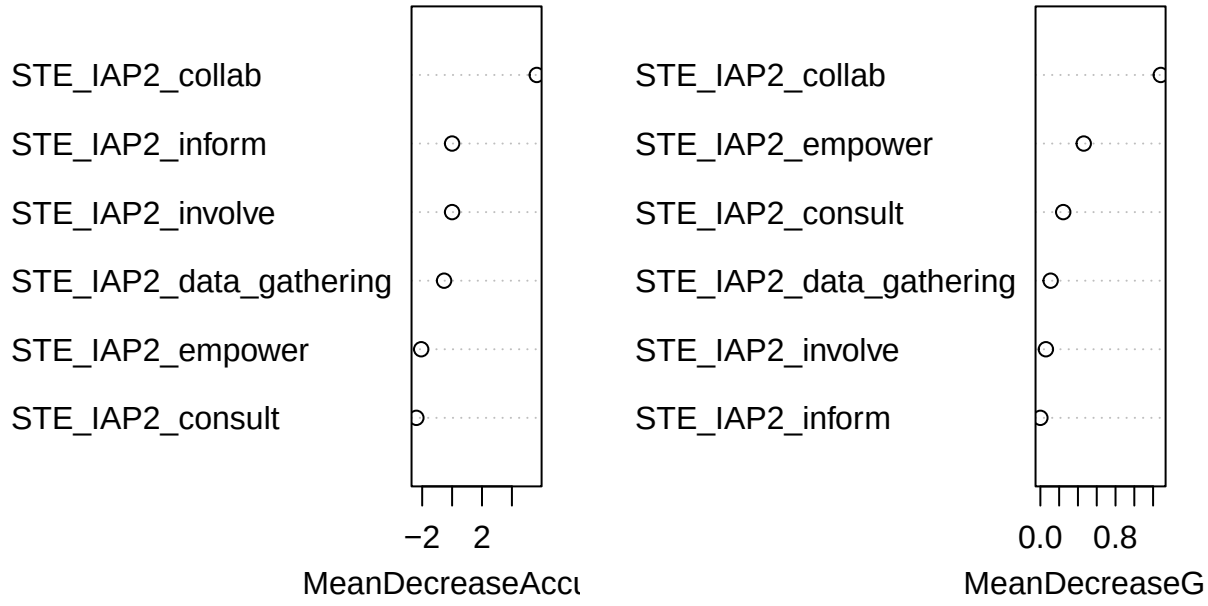
```
##
## Call:
##  randomForest(formula = S_model_YN ~ SC_researcher + SC_datagathering +      SC_inform + SC_perspecti
##                Type of random forest: classification
##                      Number of trees: 500
## No. of variables tried at each split: 2
##
##         OOB estimate of  error rate: 21.82%
## Confusion matrix:
##     Y N class.error
## Y 258 0           0
## N  72 0           1

## Confusion Matrix and Statistics
##
##           Reference
## Prediction   N   Y
##          N   0   0
##          Y 147   6
##
##                Accuracy : 0.0392
##                  95% CI : (0.0145, 0.0834)
##     No Information Rate : 0.9608
##     P-Value [Acc > NIR] : 1
##
##                   Kappa : 0
##
##  Mcnemar's Test P-Value : <2e-16
##
##             Sensitivity : 0.00000
##             Specificity : 1.00000
##          Pos Pred Value :     NaN
##          Neg Pred Value : 0.03922
##              Prevalence : 0.96078
##          Detection Rate : 0.00000
##    Detection Prevalence : 0.00000
##       Balanced Accuracy : 0.50000
##
##        'Positive' Class : N
##
```


No. of Nodes for the Trees
Frequency
0
20
40
60
80
100
2
4
6
8
10
treesize(rf)




```
##                            Y          N MeanDecreaseAccuracy MeanDecreaseGini
## SC_researcher      1.1457297 -2.5334842           -0.3360464       0.45478505
## SC_datagathering -0.2399128 -2.4901722           -1.4838790       0.38019094
## SC_inform        -4.9014401 -3.8790427           -4.7122914       0.35144157
## SC_perspectives   0.0000000  0.0000000            0.0000000       0.00000000
## SC_plan          -2.8992270 -0.8176629           -1.9676076       0.79030860
## SC_identify      -3.1750522 -2.6729985           -3.0114678       0.28437746
## SC_envision       0.0000000  0.0000000            0.0000000       0.06092482
## SC_implement     -4.0248826 -5.2654176           -4.8458713       0.41186550
```


Balanced Model − No. of Nodes for the Trees
Frequency
0
50
100
150
2
3
4
5
6
treesize(rf2)




```
##                                Y          N MeanDecreaseAccuracy
## STE_IAP2_data_gathering -1.714271  1.4170505           -0.5356001
## STE_IAP2_inform          0.000000  0.0000000            0.0000000
## STE_IAP2_consult        -3.206898  1.3894250           -2.3882748
## STE_IAP2_involve         0.000000  0.0000000            0.0000000
## STE_IAP2_collab          4.719809  5.4278101            5.6614223
## STE_IAP2_empower        -2.901244 -0.6873217           -2.0647145
##                         MeanDecreaseGini
## STE_IAP2_data_gathering       0.10920976
## STE_IAP2_inform               0.00000000
## STE_IAP2_consult              0.24319122
## STE_IAP2_involve              0.05878455
## STE_IAP2_collab               1.28172077
## STE_IAP2_empower              0.46166708
```

Researcher Diversity Modeling - solution proposed

Regression Testing - Diversity of researchers vs solution

Regression of whether Diversity of researchers predicts if a solution was proposed (Y/N). In order to represent diversity, we have used a simple ratio calculation which sums the number of researcher types involved, divided by the total number of possible researcher options. A ratio which is closer to 1 has a greater level of researcher diversity.

```
##
## Call:
## glm(formula = solution_proposed_YN ~ R_ratio, family = binomial,
##     data = crcdata)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -0.2931  -0.2846  -0.2764  -0.2684   2.6296
##
## Coefficients:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept)  -3.1262     0.4876  -6.412 1.44e-10 ***
## R_ratio      -0.5981     2.0612  -0.290    0.772
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 153.75  on 482  degrees of freedom
## Residual deviance: 153.66  on 481  degrees of freedom
## AIC: 157.66
##
## Number of Fisher Scoring iterations: 6
```

Odds Ratio - Diversity of researchers vs solution

Odds of whether Diversity of researchers predicts if a solution was proposed (Y/N). In order to represent diversity, we have used a simple ratio calculation which sums the number of researcher types involved, divided by the total number of possible researcher options. A ratio which is closer to 1 has a greater level of researcher diversity.

```
##
## Logistic regression predicting solution_proposed_YN : Y vs N
##
##                       OR(95%CI)          P(Wald's test) P(LR-test)
## R_ratio (cont. var.) 0.55 (0.01,31.25)  0.772          0.769
##
## Log-likelihood = -76.8308
## No. of observations = 483
## AIC value = 157.6617
```

Stakeholder Engagement Modeling - Ghodsvali

Regression Testing - Stakeholder type vs level of engagement (Ghodsvali)

```
## Response ST_farmers :
##
## Call:
## lm(formula = ST_farmers ~ STE_G_nominal + STE_G_instrumental +
##     STE_G_representation + STE_G_transformative, data = crcdata)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.4444  0.0000  0.0000  0.0000  0.6786
##
## Coefficients:
##                         Estimate Std. Error t value Pr(>|t|)
## (Intercept)          1.389e-16  1.025e-02   0.000        1
## STE_G_nominal        3.214e-01  3.995e-02   8.046 6.83e-15 ***
## STE_G_instrumental   3.947e-01  3.469e-02  11.378  < 2e-16 ***
## STE_G_representation 3.636e-01  6.245e-02   5.823 1.06e-08 ***
## STE_G_transformative 4.444e-01  6.887e-02   6.453 2.69e-10 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2043 on 478 degrees of freedom
## Multiple R-squared:  0.3322, Adjusted R-squared:  0.3266
## F-statistic: 59.45 on 4 and 478 DF,  p-value: < 2.2e-16
##
##
## Response ST_combined_gov :
##
## Call:
## lm(formula = ST_combined_gov ~ STE_G_nominal + STE_G_instrumental +
##     STE_G_representation + STE_G_transformative, data = crcdata)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.9091  0.0000  0.0000  0.0000  0.7500
##
## Coefficients:
##                          Estimate Std. Error t value Pr(>|t|)
## (Intercept)          -5.153e-16  8.805e-03   0.000        1
## STE_G_nominal         2.500e-01  3.430e-02   7.288 1.31e-12 ***
## STE_G_instrumental    6.579e-01  2.979e-02  22.084  < 2e-16 ***
## STE_G_representation  9.091e-01  5.362e-02  16.953  < 2e-16 ***
## STE_G_transformative  1.000e+00  5.914e-02  16.910  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1754 on 478 degrees of freedom
## Multiple R-squared:  0.6775, Adjusted R-squared:  0.6748
## F-statistic:   251 on 4 and 478 DF,  p-value: < 2.2e-16
##
##
```

```
## Response ST_tribal :
##
## Call:
## lm(formula = ST_tribal ~ STE_G_nominal + STE_G_instrumental +
##     STE_G_representation + STE_G_transformative, data = crcdata)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.1071  0.0000  0.0000  0.0000  0.9737
##
## Coefficients:
##                          Estimate Std. Error t value Pr(>|t|)
## (Intercept)             8.335e-17  4.387e-03   0.000   1.0000
## STE_G_nominal           1.071e-01  1.709e-02   6.269 8.14e-10 ***
## STE_G_instrumental      2.632e-02  1.484e-02   1.773   0.0769 .
## STE_G_representation -1.956e-17  2.672e-02   0.000   1.0000
## STE_G_transformative -1.957e-17  2.947e-02   0.000   1.0000
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.08741 on 478 degrees of freedom
## Multiple R-squared:  0.07931,    Adjusted R-squared:  0.07161
## F-statistic: 10.29 on 4 and 478 DF,  p-value: 5.285e-08
##
##
## Response ST_combined_coalition :
##
## Call:
## lm(formula = ST_combined_coalition ~ STE_G_nominal + STE_G_instrumental +
##     STE_G_representation + STE_G_transformative, data = crcdata)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.5556  0.0000  0.0000  0.0000  0.9286
##
## Coefficients:
##                          Estimate Std. Error t value Pr(>|t|)
## (Intercept)            -3.997e-16  8.475e-03   0.000    1.000
## STE_G_nominal           7.143e-02  3.302e-02   2.163    0.031 *
## STE_G_instrumental      2.632e-01  2.867e-02   9.178  < 2e-16 ***
## STE_G_representation    2.727e-01  5.161e-02   5.284 1.92e-07 ***
## STE_G_transformative    5.556e-01  5.692e-02   9.760  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1689 on 478 degrees of freedom
## Multiple R-squared:  0.2891, Adjusted R-squared:  0.2831
## F-statistic: 48.59 on 4 and 478 DF,  p-value: < 2.2e-16
##
##
## Response ST_combined_industry :
##
## Call:
## lm(formula = ST_combined_industry ~ STE_G_nominal + STE_G_instrumental +
```

```
##     STE_G_representation + STE_G_transformative, data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.63636 -0.00252 -0.00252 -0.00252  0.99748
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)           0.002519   0.009635   0.261  0.79387
## STE_G_nominal         0.104624   0.037537   2.787  0.00553 **
## STE_G_instrumental    0.550113   0.032599  16.875  < 2e-16 ***
## STE_G_representation  0.633845   0.058679  10.802  < 2e-16 ***
## STE_G_transformative  0.330814   0.064713   5.112 4.62e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.192 on 478 degrees of freedom
## Multiple R-squared:  0.4574, Adjusted R-squared:  0.4528
## F-statistic: 100.7 on 4 and 478 DF,  p-value: < 2.2e-16
##
##
## Response ST_migrants :
##
## Call:
## lm(formula = ST_migrants ~ STE_G_nominal + STE_G_instrumental +
##     STE_G_representation + STE_G_transformative, data = crcdata)
##
## Residuals:
##    Min     1Q Median     3Q    Max
##      0      0      0      0      0
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)                  0          0     NaN      NaN
## STE_G_nominal                0          0     NaN      NaN
## STE_G_instrumental           0          0     NaN      NaN
## STE_G_representation         0          0     NaN      NaN
## STE_G_transformative         0          0     NaN      NaN
##
## Residual standard error: 0 on 478 degrees of freedom
## Multiple R-squared:    NaN,  Adjusted R-squared:    NaN
## F-statistic:   NaN on 4 and 478 DF,  p-value: NA
##
##
## Response ST_youth :
##
## Call:
## lm(formula = ST_youth ~ STE_G_nominal + STE_G_instrumental +
##     STE_G_representation + STE_G_transformative, data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.05263  0.00000  0.00000  0.00000  0.96429
##
```

```
## Coefficients:
##                          Estimate Std. Error t value Pr(>|t|)
## (Intercept)          -2.210e-17  3.881e-03   0.000   1.0000
## STE_G_nominal         3.571e-02  1.512e-02   2.362   0.0186 *
## STE_G_instrumental    5.263e-02  1.313e-02   4.008 7.11e-05 ***
## STE_G_representation -9.566e-22  2.364e-02   0.000   1.0000
## STE_G_transformative  3.849e-19  2.607e-02   0.000   1.0000
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.07734 on 478 degrees of freedom
## Multiple R-squared:  0.04104,    Adjusted R-squared:  0.03301
## F-statistic: 5.114 on 4 and 478 DF,  p-value: 0.0004836
##
##
## Response ST_public :
##
## Call:
## lm(formula = ST_public ~ STE_G_nominal + STE_G_instrumental +
##     STE_G_representation + STE_G_transformative, data = crcdata)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.2857  0.0000  0.0000  0.0000  0.9091
##
## Coefficients:
##                          Estimate Std. Error t value Pr(>|t|)
## (Intercept)          1.743e-16  8.123e-03   0.000   1.0000
## STE_G_nominal        2.857e-01  3.165e-02   9.028  < 2e-16 ***
## STE_G_instrumental   1.316e-01  2.748e-02   4.788 2.25e-06 ***
## STE_G_representation 9.091e-02  4.947e-02   1.838   0.0667 .
## STE_G_transformative 2.222e-01  5.456e-02   4.073 5.43e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1618 on 478 degrees of freedom
## Multiple R-squared:  0.1906, Adjusted R-squared:  0.1839
## F-statistic: 28.14 on 4 and 478 DF,  p-value: < 2.2e-16
##
##
## Response ST_university :
##
## Call:
## lm(formula = ST_university ~ STE_G_nominal + STE_G_instrumental +
##     STE_G_representation + STE_G_transformative, data = crcdata)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.4444  0.0000  0.0000  0.0000  0.8929
##
## Coefficients:
##                          Estimate Std. Error t value Pr(>|t|)
## (Intercept)          -4.395e-16  9.265e-03   0.000  1.00000
## STE_G_nominal         1.071e-01  3.609e-02   2.968  0.00314 **
```

```
## STE_G_instrumental    3.684e-01  3.135e-02  11.753  < 2e-16 ***
## STE_G_representation  3.636e-01  5.642e-02   6.445 2.83e-10 ***
## STE_G_transformative  4.444e-01  6.223e-02   7.142 3.44e-12 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1846 on 478 degrees of freedom
## Multiple R-squared:  0.3129, Adjusted R-squared:  0.3072
## F-statistic: 54.42 on 4 and 478 DF,  p-value: < 2.2e-16
##
##
## Response ST_experts :
##
## Call:
## lm(formula = ST_experts ~ STE_G_nominal + STE_G_instrumental +
##     STE_G_representation + STE_G_transformative, data = crcdata)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.2368  0.0000  0.0000  0.0000  0.8889
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)          -2.513e-16  8.220e-03   0.000 1.000000
## STE_G_nominal         1.429e-01  3.202e-02   4.461 1.02e-05 ***
## STE_G_instrumental    2.368e-01  2.781e-02   8.516  < 2e-16 ***
## STE_G_representation  1.818e-01  5.006e-02   3.632 0.000312 ***
## STE_G_transformative  1.111e-01  5.521e-02   2.013 0.044724 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1638 on 478 degrees of freedom
## Multiple R-squared:  0.1712, Adjusted R-squared:  0.1642
## F-statistic: 24.68 on 4 and 478 DF,  p-value: < 2.2e-16
```

Stakeholder Engagement Modeling - IAP2

Regression Testing - Stakeholder type vs level of engagement (IAP2)

```
## Response ST_farmers :
##
## Call:
## lm(formula = ST_farmers ~ STE_IAP2_data_gathering + STE_IAP2_inform +
##     STE_IAP2_consult + STE_IAP2_involve + STE_IAP2_collab + STE_IAP2_empower,
##     data = crcdata)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.5000  0.0000  0.0000  0.0000  0.8571
##
## Coefficients:
##                           Estimate Std. Error t value Pr(>|t|)
## (Intercept)              1.819e-16  1.008e-02   0.000 1.000000
## STE_IAP2_data_gathering 3.437e-01  3.689e-02   9.317  < 2e-16 ***
## STE_IAP2_inform         5.557e-17  2.010e-01   0.000 1.000000
## STE_IAP2_consult        4.545e-01  3.637e-02  12.497  < 2e-16 ***
## STE_IAP2_involve        1.429e-01  7.655e-02   1.866 0.062625 .
## STE_IAP2_collab         2.857e-01  7.655e-02   3.732 0.000213 ***
## STE_IAP2_empower        5.000e-01  8.258e-02   6.055 2.86e-09 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2008 on 476 degrees of freedom
## Multiple R-squared:  0.3579, Adjusted R-squared:  0.3498
## F-statistic: 44.22 on 6 and 476 DF,  p-value: < 2.2e-16
##
##
## Response ST_combined_gov :
##
## Call:
## lm(formula = ST_combined_gov ~ STE_IAP2_data_gathering + STE_IAP2_inform +
##     STE_IAP2_consult + STE_IAP2_involve + STE_IAP2_collab + STE_IAP2_empower,
##     data = crcdata)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.8571  0.0000  0.0000  0.0000  0.7188
##
## Coefficients:
##                           Estimate Std. Error t value Pr(>|t|)
## (Intercept)              2.652e-16  8.808e-03   0.000        1
## STE_IAP2_data_gathering 2.812e-01  3.225e-02   8.721  < 2e-16 ***
## STE_IAP2_inform         1.000e+00  1.757e-01   5.691 2.21e-08 ***
## STE_IAP2_consult        6.667e-01  3.179e-02  20.969  < 2e-16 ***
## STE_IAP2_involve        8.571e-01  6.691e-02  12.810  < 2e-16 ***
## STE_IAP2_collab         1.000e+00  6.691e-02  14.945  < 2e-16 ***
## STE_IAP2_empower        1.000e+00  7.218e-02  13.854  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##
## Residual standard error: 0.1755 on 476 degrees of freedom
## Multiple R-squared:  0.6786, Adjusted R-squared:  0.6746
## F-statistic: 167.5 on 6 and 476 DF,  p-value: < 2.2e-16
##
##
## Response ST_tribal :
##
## Call:
## lm(formula = ST_tribal ~ STE_IAP2_data_gathering + STE_IAP2_inform +
##     STE_IAP2_consult + STE_IAP2_involve + STE_IAP2_collab + STE_IAP2_empower,
##     data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.09375  0.00000  0.00000  0.00000  0.96970
##
## Coefficients:
##                           Estimate Std. Error t value Pr(>|t|)
## (Intercept)              5.809e-17  4.418e-03   0.000    1.000
## STE_IAP2_data_gathering  9.375e-02  1.618e-02   5.796 1.24e-08 ***
## STE_IAP2_inform         -9.986e-18  8.814e-02   0.000    1.000
## STE_IAP2_consult         3.030e-02  1.595e-02   1.900    0.058 .
## STE_IAP2_involve        -1.244e-17  3.356e-02   0.000    1.000
## STE_IAP2_collab         -2.114e-17  3.356e-02   0.000    1.000
## STE_IAP2_empower         1.784e-18  3.621e-02   0.000    1.000
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.08803 on 476 degrees of freedom
## Multiple R-squared:  0.07019,    Adjusted R-squared:  0.05847
## F-statistic: 5.989 on 6 and 476 DF,  p-value: 4.745e-06
##
##
## Response ST_combined_coalition :
##
## Call:
## lm(formula = ST_combined_coalition ~ STE_IAP2_data_gathering +
##     STE_IAP2_inform + STE_IAP2_consult + STE_IAP2_involve + STE_IAP2_collab +
##     STE_IAP2_empower, data = crcdata)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.5714  0.0000  0.0000  0.0000  0.9375
##
## Coefficients:
##                           Estimate Std. Error t value Pr(>|t|)
## (Intercept)              2.027e-16  8.352e-03   0.000   1.0000
## STE_IAP2_data_gathering 6.250e-02  3.058e-02   2.044   0.0415 *
## STE_IAP2_inform          1.250e-16  1.666e-01   0.000   1.0000
## STE_IAP2_consult         2.727e-01  3.015e-02   9.046  < 2e-16 ***
## STE_IAP2_involve         4.286e-01  6.345e-02   6.754 4.20e-11 ***
## STE_IAP2_collab          5.714e-01  6.345e-02   9.006  < 2e-16 ***
## STE_IAP2_empower         3.333e-01  6.845e-02   4.870 1.52e-06 ***
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1664 on 476 degrees of freedom
## Multiple R-squared:  0.3124, Adjusted R-squared:  0.3037
## F-statistic: 36.05 on 6 and 476 DF,  p-value: < 2.2e-16
##
##
## Response ST_combined_industry :
##
## Call:
## lm(formula = ST_combined_industry ~ STE_IAP2_data_gathering +
##     STE_IAP2_inform + STE_IAP2_consult + STE_IAP2_involve + STE_IAP2_collab +
##     STE_IAP2_empower, data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.71429 -0.00252 -0.00252 -0.00252  0.99748
##
## Coefficients:
##                           Estimate Std. Error t value Pr(>|t|)
## (Intercept)               0.002519   0.009660   0.261  0.79439
## STE_IAP2_data_gathering   0.153731   0.035370   4.346 1.69e-05 ***
## STE_IAP2_inform          -0.002519   0.192716  -0.013  0.98958
## STE_IAP2_consult          0.573239   0.034870  16.439  < 2e-16 ***
## STE_IAP2_involve          0.711767   0.073387   9.699  < 2e-16 ***
## STE_IAP2_collab           0.283195   0.073387   3.859  0.00013 ***
## STE_IAP2_empower          0.497481   0.079169   6.284 7.47e-10 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1925 on 476 degrees of freedom
## Multiple R-squared:  0.4568, Adjusted R-squared:   0.45
## F-statistic: 66.72 on 6 and 476 DF,  p-value: < 2.2e-16
##
##
## Response ST_migrants :
##
## Call:
## lm(formula = ST_migrants ~ STE_IAP2_data_gathering + STE_IAP2_inform +
##     STE_IAP2_consult + STE_IAP2_involve + STE_IAP2_collab + STE_IAP2_empower,
##     data = crcdata)
##
## Residuals:
##    Min     1Q Median     3Q    Max
##      0      0      0      0      0
##
## Coefficients:
##                           Estimate Std. Error t value Pr(>|t|)
## (Intercept)                      0          0     NaN      NaN
## STE_IAP2_data_gathering          0          0     NaN      NaN
## STE_IAP2_inform                  0          0     NaN      NaN
## STE_IAP2_consult                 0          0     NaN      NaN
## STE_IAP2_involve                 0          0     NaN      NaN
```

```
## STE_IAP2_collab                0          0     NaN      NaN
## STE_IAP2_empower               0          0     NaN      NaN
##
## Residual standard error: 0 on 476 degrees of freedom
## Multiple R-squared:    NaN,  Adjusted R-squared:    NaN
## F-statistic:   NaN on 6 and 476 DF,  p-value: NA
##
##
## Response ST_youth :
##
## Call:
## lm(formula = ST_youth ~ STE_IAP2_data_gathering + STE_IAP2_inform +
##     STE_IAP2_consult + STE_IAP2_involve + STE_IAP2_collab + STE_IAP2_empower,
##     data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.06061  0.00000  0.00000  0.00000  0.96875
##
## Coefficients:
##                            Estimate Std. Error t value Pr(>|t|)
## (Intercept)              -7.893e-18  3.882e-03   0.000   1.0000
## STE_IAP2_data_gathering   3.125e-02  1.421e-02   2.199   0.0284 *
## STE_IAP2_inform           1.216e-17  7.744e-02   0.000   1.0000
## STE_IAP2_consult          6.061e-02  1.401e-02   4.325 1.86e-05 ***
## STE_IAP2_involve          1.487e-18  2.949e-02   0.000   1.0000
## STE_IAP2_collab          -3.033e-17  2.949e-02   0.000   1.0000
## STE_IAP2_empower          5.797e-18  3.181e-02   0.000   1.0000
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.07734 on 476 degrees of freedom
## Multiple R-squared:  0.04489,    Adjusted R-squared:  0.03285
## F-statistic: 3.729 on 6 and 476 DF,  p-value: 0.001235
##
##
## Response ST_public :
##
## Call:
## lm(formula = ST_public ~ STE_IAP2_data_gathering + STE_IAP2_inform +
##     STE_IAP2_consult + STE_IAP2_involve + STE_IAP2_collab + STE_IAP2_empower,
##     data = crcdata)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.3333  0.0000  0.0000  0.0000  0.8788
##
## Coefficients:
##                            Estimate Std. Error t value Pr(>|t|)
## (Intercept)              1.162e-16  8.026e-03   0.000   1.0000
## STE_IAP2_data_gathering  2.812e-01  2.939e-02   9.570  < 2e-16 ***
## STE_IAP2_inform          2.084e-17  1.601e-01   0.000   1.0000
## STE_IAP2_consult         1.212e-01  2.897e-02   4.184 3.42e-05 ***
## STE_IAP2_involve         1.429e-01  6.098e-02   2.343   0.0196 *
```

```
## STE_IAP2_collab         -2.322e-15  6.098e-02   0.000   1.0000
## STE_IAP2_empower         3.333e-01  6.578e-02   5.067 5.78e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1599 on 476 degrees of freedom
## Multiple R-squared:  0.213,  Adjusted R-squared:  0.2031
## F-statistic: 21.48 on 6 and 476 DF,  p-value: < 2.2e-16
##
##
## Response ST_university :
##
## Call:
## lm(formula = ST_university ~ STE_IAP2_data_gathering + STE_IAP2_inform +
##     STE_IAP2_consult + STE_IAP2_involve + STE_IAP2_collab + STE_IAP2_empower,
##     data = crcdata)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.4286  0.0000  0.0000  0.0000  0.8750
##
## Coefficients:
##                           Estimate Std. Error t value Pr(>|t|)
## (Intercept)             -6.441e-17  9.242e-03   0.000 1.000000
## STE_IAP2_data_gathering  1.250e-01  3.384e-02   3.694 0.000246 ***
## STE_IAP2_inform          1.389e-16  1.844e-01   0.000 1.000000
## STE_IAP2_consult         3.939e-01  3.336e-02  11.808  < 2e-16 ***
## STE_IAP2_involve         4.286e-01  7.021e-02   6.104 2.15e-09 ***
## STE_IAP2_collab          4.286e-01  7.021e-02   6.104 2.15e-09 ***
## STE_IAP2_empower         3.333e-01  7.574e-02   4.401 1.33e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1841 on 476 degrees of freedom
## Multiple R-squared:  0.3191, Adjusted R-squared:  0.3105
## F-statistic: 37.18 on 6 and 476 DF,  p-value: < 2.2e-16
##
##
## Response ST_experts :
##
## Call:
## lm(formula = ST_experts ~ STE_IAP2_data_gathering + STE_IAP2_inform +
##     STE_IAP2_consult + STE_IAP2_involve + STE_IAP2_collab + STE_IAP2_empower,
##     data = crcdata)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.2857  0.0000  0.0000  0.0000  0.8750
##
## Coefficients:
##                           Estimate Std. Error t value Pr(>|t|)
## (Intercept)             -3.031e-17  8.078e-03   0.000   1.0000
## STE_IAP2_data_gathering  1.250e-01  2.958e-02   4.226 2.85e-05 ***
## STE_IAP2_inform         -3.821e-17  1.612e-01   0.000   1.0000
```

```
## STE_IAP2_consult         2.727e-01  2.916e-02   9.353  < 2e-16 ***
## STE_IAP2_involve         1.429e-01  6.137e-02   2.328   0.0203 *
## STE_IAP2_collab          2.857e-01  6.137e-02   4.656 4.19e-06 ***
## STE_IAP2_empower         2.252e-17  6.620e-02   0.000   1.0000
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.161 on 476 degrees of freedom
## Multiple R-squared:  0.2029, Adjusted R-squared:  0.1928
## F-statistic: 20.19 on 6 and 476 DF,  p-value: < 2.2e-16
```

Stakeholder Engagement Modeling - Local

Regression Testing - Stakeholder type vs level of engagement (local)

```
## Response ST_farmers :
##
## Call:
## lm(formula = ST_farmers ~ SC_researcher + SC_datagathering +
##     SC_inform + SC_perspectives + SC_plan + SC_identify + SC_envision +
##     SC_implement, data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.71652 -0.00334 -0.00334 -0.00334  0.73536
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)       0.003339   0.010003   0.334 0.738686
## SC_researcher     0.261297   0.037237   7.017 7.87e-12 ***
## SC_datagathering  0.451879   0.049398   9.148  < 2e-16 ***
## SC_inform        -0.003339   0.100361  -0.033 0.973474
## SC_perspectives   0.996661   0.199972   4.984 8.75e-07 ***
## SC_plan           0.269388   0.061044   4.413 1.26e-05 ***
## SC_identify       0.441106   0.048126   9.166  < 2e-16 ***
## SC_envision       0.996661   0.199972   4.984 8.75e-07 ***
## SC_implement      0.344402   0.089975   3.828 0.000147 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1997 on 474 degrees of freedom
## Multiple R-squared:  0.3672, Adjusted R-squared:  0.3565
## F-statistic: 34.38 on 8 and 474 DF,  p-value: < 2.2e-16
##
##
## Response ST_combined_gov :
##
## Call:
## lm(formula = ST_combined_gov ~ SC_researcher + SC_datagathering +
##     SC_inform + SC_perspectives + SC_plan + SC_identify + SC_envision +
##     SC_implement, data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.83333 -0.00254 -0.00254 -0.00254  0.66920
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)      0.002540   0.009348   0.272    0.786
## SC_researcher    0.376479   0.034799  10.819  < 2e-16 ***
## SC_datagathering 0.328255   0.046164   7.111 4.28e-12 ***
## SC_inform        0.997460   0.093790  10.635  < 2e-16 ***
## SC_perspectives  0.997460   0.186879   5.337 1.46e-07 ***
## SC_plan          0.633823   0.057047  11.111  < 2e-16 ***
## SC_identify      0.830793   0.044975  18.472  < 2e-16 ***
```

```
## SC_envision      0.997460   0.186879   5.337 1.46e-07 ***
## SC_implement     0.922164   0.084084  10.967  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1866 on 474 degrees of freedom
## Multiple R-squared:  0.638,  Adjusted R-squared:  0.6319
## F-statistic: 104.4 on 8 and 474 DF,  p-value: < 2.2e-16
##
##
## Response ST_tribal :
##
## Call:
## lm(formula = ST_tribal ~ SC_researcher + SC_datagathering + SC_inform +
##     SC_perspectives + SC_plan + SC_identify + SC_envision + SC_implement,
##     data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.17478 -0.00056 -0.00056 -0.00056  0.93874
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)       0.0005626  0.0043947   0.128 0.898194
## SC_researcher     0.0607016  0.0163595   3.710 0.000231 ***
## SC_datagathering  0.1135138  0.0217020   5.231 2.54e-07 ***
## SC_inform        -0.0005626  0.0440915  -0.013 0.989825
## SC_perspectives  -0.0005626  0.0878538  -0.006 0.994894
## SC_plan          -0.0005626  0.0268183  -0.021 0.983273
## SC_identify      -0.0005626  0.0211432  -0.027 0.978784
## SC_envision      -0.0005626  0.0878538  -0.006 0.994894
## SC_implement     -0.0127029  0.0395288  -0.321 0.748081
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.08774 on 474 degrees of freedom
## Multiple R-squared:  0.08005,    Adjusted R-squared:  0.06453
## F-statistic: 5.156 on 8 and 474 DF,  p-value: 3.494e-06
##
##
## Response ST_combined_coalition :
##
## Call:
## lm(formula = ST_combined_coalition ~ SC_researcher + SC_datagathering +
##     SC_inform + SC_perspectives + SC_plan + SC_identify + SC_envision +
##     SC_implement, data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.38889 -0.00146 -0.00146 -0.00146  0.95208
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)       0.001465   0.008570   0.171  0.86434
```

```
## SC_researcher     0.185377   0.031902   5.811 1.14e-08 ***
## SC_datagathering  0.046454   0.042321   1.098  0.27291
## SC_inform         0.248535   0.085982   2.891  0.00402 **
## SC_perspectives   0.998535   0.171322   5.828 1.04e-08 ***
## SC_plan           0.271262   0.052298   5.187 3.17e-07 ***
## SC_identify       0.387424   0.041231   9.396  < 2e-16 ***
## SC_envision      -0.001465   0.171322  -0.009  0.99318
## SC_implement      0.161460   0.077084   2.095  0.03674 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1711 on 474 degrees of freedom
## Multiple R-squared:  0.2761, Adjusted R-squared:  0.2639
## F-statistic:  22.6 on 8 and 474 DF,  p-value: < 2.2e-16
##
##
## Response ST_combined_industry :
##
## Call:
## lm(formula = ST_combined_industry ~ SC_researcher + SC_datagathering +
##     SC_inform + SC_perspectives + SC_plan + SC_identify + SC_envision +
##     SC_implement, data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.72222 -0.00501 -0.00501 -0.00501  0.99499
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)       0.005006   0.009833   0.509    0.611
## SC_researcher     0.202319   0.036604   5.527 5.38e-08 ***
## SC_datagathering  0.218387   0.048558   4.497 8.66e-06 ***
## SC_inform         0.494994   0.098653   5.018 7.42e-07 ***
## SC_perspectives  -0.005006   0.196570  -0.025    0.980
## SC_plan           0.449539   0.060005   7.492 3.36e-13 ***
## SC_identify       0.717216   0.047307  15.161  < 2e-16 ***
## SC_envision       0.994994   0.196570   5.062 5.95e-07 ***
## SC_implement      0.354530   0.088444   4.009 7.10e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1963 on 474 degrees of freedom
## Multiple R-squared:  0.4372, Adjusted R-squared:  0.4277
## F-statistic: 46.03 on 8 and 474 DF,  p-value: < 2.2e-16
##
##
## Response ST_migrants :
##
## Call:
## lm(formula = ST_migrants ~ SC_researcher + SC_datagathering +
##     SC_inform + SC_perspectives + SC_plan + SC_identify + SC_envision +
##     SC_implement, data = crcdata)
##
## Residuals:
```

```
##    Min     1Q Median     3Q    Max
##      0      0      0      0      0
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)             0          0     NaN      NaN
## SC_researcher           0          0     NaN      NaN
## SC_datagathering        0          0     NaN      NaN
## SC_inform               0          0     NaN      NaN
## SC_perspectives         0          0     NaN      NaN
## SC_plan                 0          0     NaN      NaN
## SC_identify             0          0     NaN      NaN
## SC_envision             0          0     NaN      NaN
## SC_implement            0          0     NaN      NaN
##
## Residual standard error: 0 on 474 degrees of freedom
## Multiple R-squared:    NaN,  Adjusted R-squared:    NaN
## F-statistic:   NaN on 8 and 474 DF,  p-value: NA
##
##
## Response ST_youth :
##
## Call:
## lm(formula = ST_youth ~ SC_researcher + SC_datagathering + SC_inform +
##     SC_perspectives + SC_plan + SC_identify + SC_envision + SC_implement,
##     data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.09091 -0.00014 -0.00014 -0.00014  0.96746
##
## Coefficients:
##                    Estimate Std. Error t value Pr(>|t|)
## (Intercept)       0.0001421  0.0038639   0.037 0.970682
## SC_researcher     0.0323956  0.0143835   2.252 0.024762 *
## SC_datagathering -0.0020477  0.0190807  -0.107 0.914582
## SC_inform        -0.0001421  0.0387659  -0.004 0.997077
## SC_perspectives  -0.0001421  0.0772425  -0.002 0.998533
## SC_plan           0.0907670  0.0235791   3.849 0.000135 ***
## SC_identify       0.0554135  0.0185894   2.981 0.003022 **
## SC_envision      -0.0001421  0.0772425  -0.002 0.998533
## SC_implement     -0.0066212  0.0347544  -0.191 0.848988
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.07715 on 474 degrees of freedom
## Multiple R-squared:  0.05379,    Adjusted R-squared:  0.03782
## F-statistic: 3.368 on 8 and 474 DF,  p-value: 0.0009066
##
##
## Response ST_public :
##
## Call:
## lm(formula = ST_public ~ SC_researcher + SC_datagathering + SC_inform +
```

```
##     SC_perspectives + SC_plan + SC_identify + SC_envision + SC_implement,
##     data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.59294 -0.00236 -0.00236 -0.00236  0.90909
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)       0.002362   0.008159   0.289  0.77236
## SC_researcher     0.241171   0.030372   7.941 1.47e-14 ***
## SC_datagathering  0.101099   0.040290   2.509  0.01243 *
## SC_inform         0.247638   0.081857   3.025  0.00262 **
## SC_perspectives  -0.002362   0.163104  -0.014  0.98845
## SC_plan           0.088547   0.049789   1.778  0.07597 .
## SC_identify       0.108749   0.039253   2.770  0.00582 **
## SC_envision      -0.002362   0.163104  -0.014  0.98845
## SC_implement      0.349404   0.073387   4.761 2.56e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1629 on 474 degrees of freedom
## Multiple R-squared:  0.1869, Adjusted R-squared:  0.1732
## F-statistic: 13.62 on 8 and 474 DF,  p-value: < 2.2e-16
##
##
## Response ST_university :
##
## Call:
## lm(formula = ST_university ~ SC_researcher + SC_datagathering +
##     SC_inform + SC_perspectives + SC_plan + SC_identify + SC_envision +
##     SC_implement, data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.51355 -0.00207 -0.00207 -0.00207  0.85599
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)       0.002075   0.009208   0.225  0.82185
## SC_researcher     0.141939   0.034279   4.141 4.10e-05 ***
## SC_datagathering  0.166047   0.045473   3.652  0.00029 ***
## SC_inform         0.497925   0.092387   5.390 1.12e-07 ***
## SC_perspectives  -0.002075   0.184084  -0.011  0.99101
## SC_plan           0.361562   0.056194   6.434 3.04e-10 ***
## SC_identify       0.442370   0.044302   9.985  < 2e-16 ***
## SC_envision       0.997925   0.184084   5.421 9.45e-08 ***
## SC_implement      0.369538   0.082827   4.462 1.02e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1839 on 474 degrees of freedom
## Multiple R-squared:  0.3241, Adjusted R-squared:  0.3127
## F-statistic: 28.41 on 8 and 474 DF,  p-value: < 2.2e-16
```

```
##
##
## Response ST_experts :
##
## Call:
## lm(formula = ST_experts ~ SC_researcher + SC_datagathering +
##     SC_inform + SC_perspectives + SC_plan + SC_identify + SC_envision +
##     SC_implement, data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.50000 -0.00099 -0.00099 -0.00099  0.89164
##
## Coefficients:
##                    Estimate Std. Error t value Pr(>|t|)
## (Intercept)       0.0009888  0.0077993   0.127  0.89917
## SC_researcher     0.1578885  0.0290334   5.438 8.64e-08 ***
## SC_datagathering  0.1073707  0.0385149   2.788  0.00552 **
## SC_inform         0.4990112  0.0782498   6.377 4.29e-10 ***
## SC_perspectives  -0.0009888  0.1559155  -0.006  0.99494
## SC_plan           0.4535566  0.0475948   9.530  < 2e-16 ***
## SC_identify       0.1101223  0.0375231   2.935  0.00350 **
## SC_envision      -0.0009888  0.1559155  -0.006  0.99494
## SC_implement     -0.0325665  0.0701524  -0.464  0.64270
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1557 on 474 degrees of freedom
## Multiple R-squared:  0.257,  Adjusted R-squared:  0.2445
## F-statistic:  20.5 on 8 and 474 DF,  p-value: < 2.2e-16
```

Regression Testing - Stakeholder type vs solution

```
##
## Call:
## glm(formula = solution_proposed_YN ~ ST_farmers + ST_combined_gov +
##     ST_tribal + ST_combined_coalition + ST_combined_industry +
##     ST_migrants + ST_youth + ST_public + ST_university + ST_experts,
##     family = binomial, data = crcdata)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.2308  -0.1333  -0.1333  -0.1333   3.0748
##
## Coefficients: (1 not defined because of singularities)
##                         Estimate Std. Error z value Pr(>|z|)
## (Intercept)              -4.7183     0.5068  -9.310  < 2e-16 ***
## ST_farmers                0.7904     0.7745   1.020    0.308
## ST_combined_gov           3.5784     0.7733   4.627  3.7e-06 ***
## ST_tribal               -14.4256  1810.3784  -0.008    0.994
## ST_combined_coalition    -0.2779     0.7639  -0.364    0.716
## ST_combined_industry     -0.6386     0.7963  -0.802    0.423
## ST_migrants                   NA         NA      NA       NA
## ST_youth                -15.6653  1939.1448  -0.008    0.994
## ST_public                 0.7992     0.7884   1.014    0.311
## ST_university             0.2918     0.7387   0.395    0.693
## ST_experts                0.4654     0.8261   0.563    0.573
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 153.75  on 482  degrees of freedom
## Residual deviance: 101.16  on 473  degrees of freedom
## AIC: 121.16
##
## Number of Fisher Scoring iterations: 16
```

Geographic Location Modeling - solution proposed

Regression Testing - Geographic area vs solution

```
##
## Call:
## glm(formula = solution_proposed_YN ~ G_notdescribed + G_local +
##     G_regional + G_national + G_multination + G_global, family = binomial,
##     data = crcdata)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -0.5008  -0.3131  -0.2456  -0.2456   2.6930
##
## Coefficients:
##                 Estimate Std. Error z value Pr(>|z|)
## (Intercept)      -3.5993     0.9175  -3.923 8.75e-05 ***
## G_notdescribed  -15.4485  3226.2802  -0.005    0.996
## G_local           0.6080     0.9937   0.612    0.541
## G_regional        0.1129     1.0068   0.112    0.911
## G_national        0.9784     1.0100   0.969    0.333
## G_multination   -14.9668  1232.6632  -0.012    0.990
## G_global        -14.9668  1966.6497  -0.008    0.994
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 153.75  on 482  degrees of freedom
## Residual deviance: 148.00  on 476  degrees of freedom
## AIC: 162
##
## Number of Fisher Scoring iterations: 17
```

```
##
## Logistic regression predicting solution_proposed_YN : Y vs N
##
##                          crude OR(95%CI)   adj. OR(95%CI)     P(Wald's test)
## G_notdescribed: 1 vs 0  0 (0,Inf)         0 (0,Inf)          0.996
##
## G_local: 1 vs 0         1.45 (0.53,3.96)  1.84 (0.26,12.88)  0.541
##
## G_regional: 1 vs 0      0.68 (0.25,1.84)  1.12 (0.16,8.05)   0.911
##
## G_national: 1 vs 0      2.21 (0.76,6.39)  2.66 (0.37,19.26)  0.333
##
## G_multination: 1 vs 0   0 (0,Inf)         0 (0,Inf)          0.99
##
## G_global: 1 vs 0        0 (0,Inf)         0 (0,Inf)          0.994
##
##                          P(LR-test)
## G_notdescribed: 1 vs 0  0.554
##
```

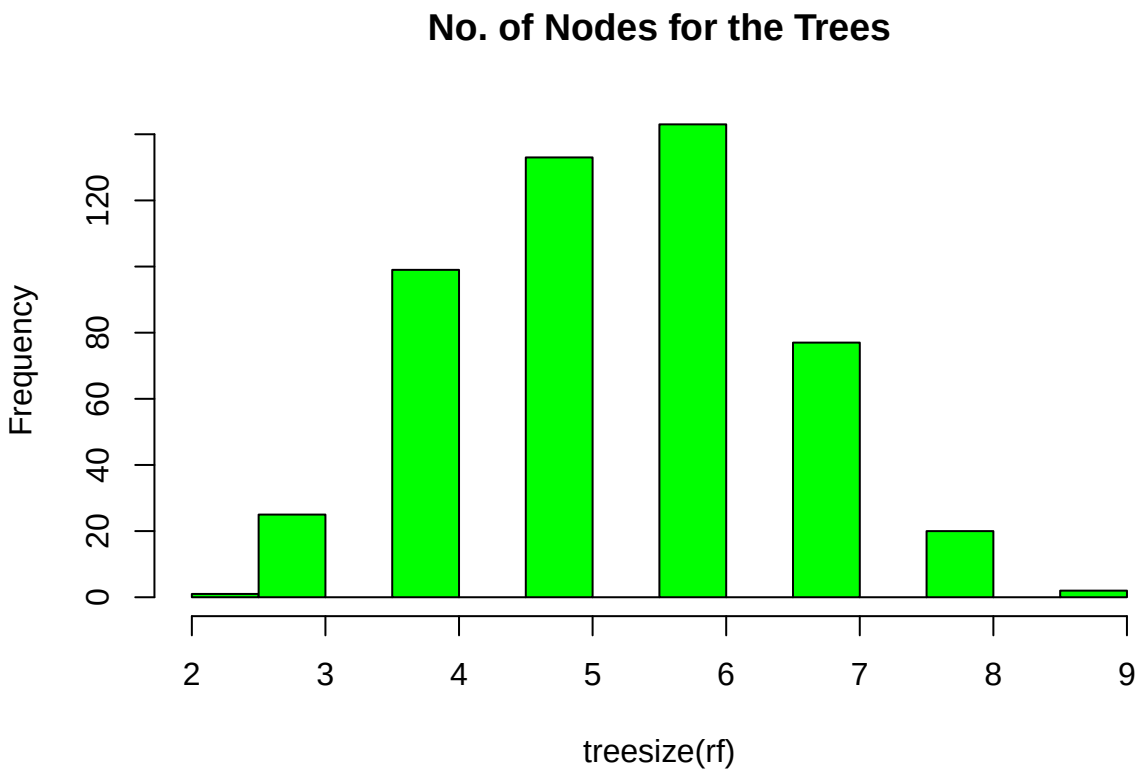
```
## G_local: 1 vs 0         0.52
##
## G_regional: 1 vs 0      0.91
##
## G_national: 1 vs 0      0.3
##
## G_multination: 1 vs 0   0.277
##
## G_global: 1 vs 0        0.466
##
## Log-likelihood = -74.0016
## No. of observations = 483
## AIC value = 162.0032
```

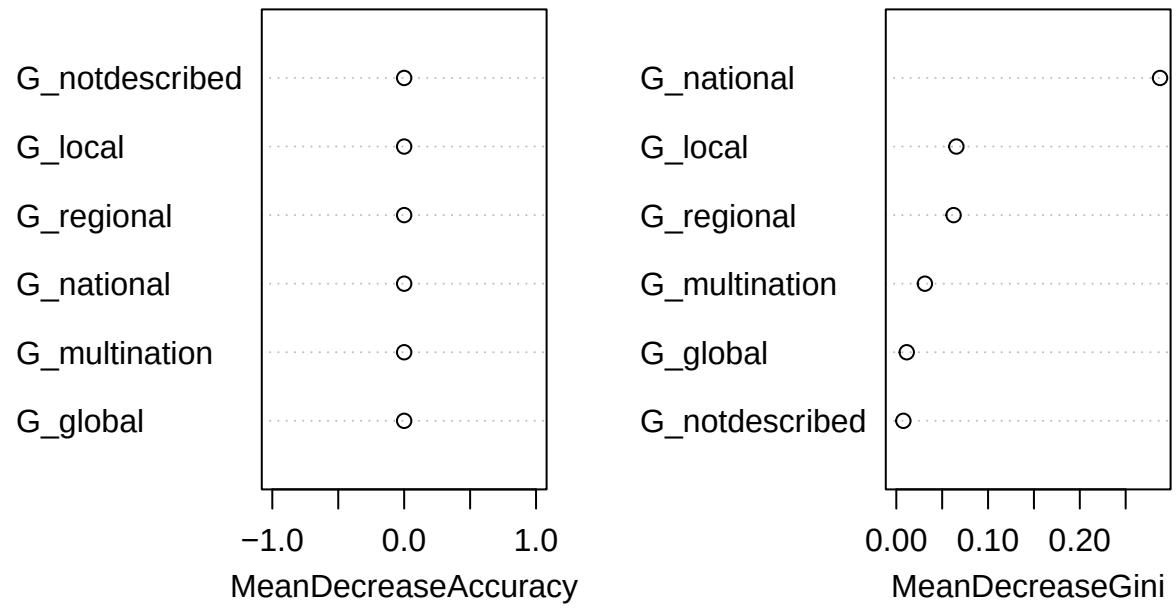
Odds Ratio - Geographic area vs solution

```
##
## Logistic regression predicting solution_proposed_YN : Y vs N
##
##                          crude OR(95%CI)   adj. OR(95%CI)     P(Wald's test)
## G_notdescribed: 1 vs 0  0 (0,Inf)         0 (0,Inf)          0.996
##
## G_local: 1 vs 0         1.45 (0.53,3.96)  1.84 (0.26,12.88)  0.541
##
## G_regional: 1 vs 0      0.68 (0.25,1.84)  1.12 (0.16,8.05)   0.911
##
## G_national: 1 vs 0      2.21 (0.76,6.39)  2.66 (0.37,19.26)  0.333
##
## G_multination: 1 vs 0   0 (0,Inf)         0 (0,Inf)          0.99
##
## G_global: 1 vs 0        0 (0,Inf)         0 (0,Inf)          0.994
##
##                          P(LR-test)
## G_notdescribed: 1 vs 0  0.554
##
## G_local: 1 vs 0         0.52
##
## G_regional: 1 vs 0      0.91
##
## G_national: 1 vs 0      0.3
##
## G_multination: 1 vs 0   0.277
##
## G_global: 1 vs 0        0.466
##
## Log-likelihood = -74.0016
## No. of observations = 483
## AIC value = 162.0032
```

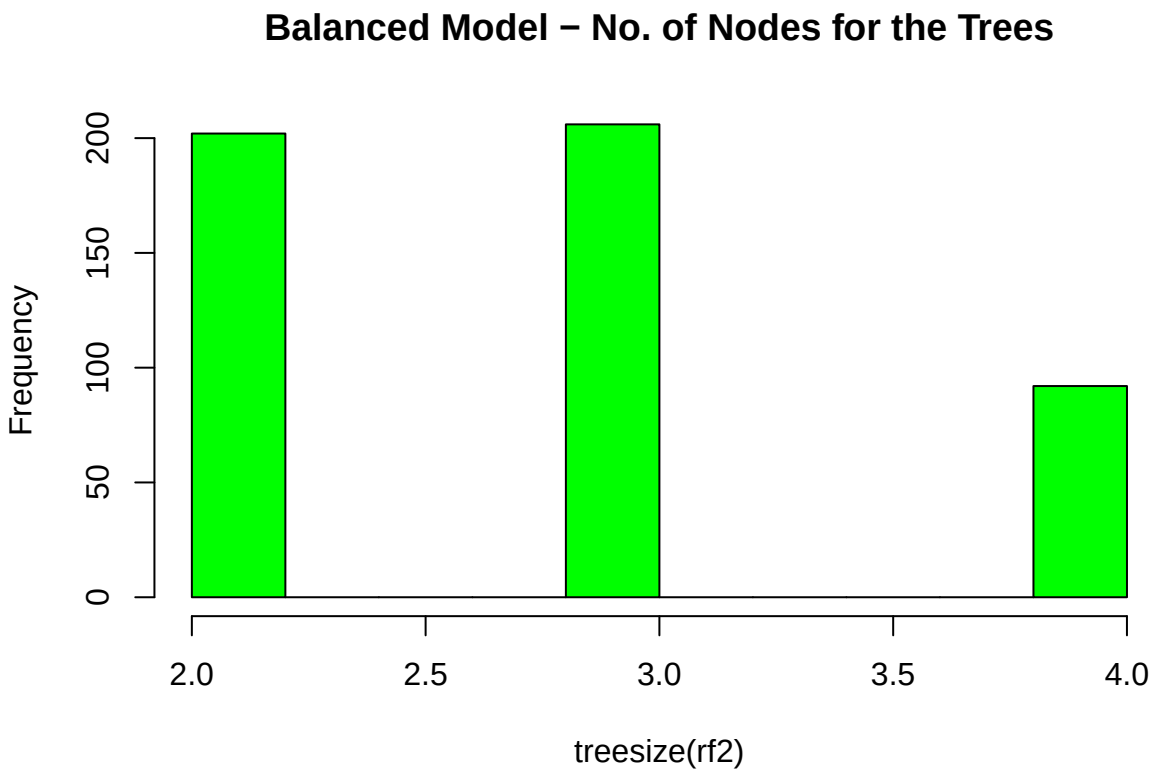
Ensembed Decision Tree - Geographic area vs solution

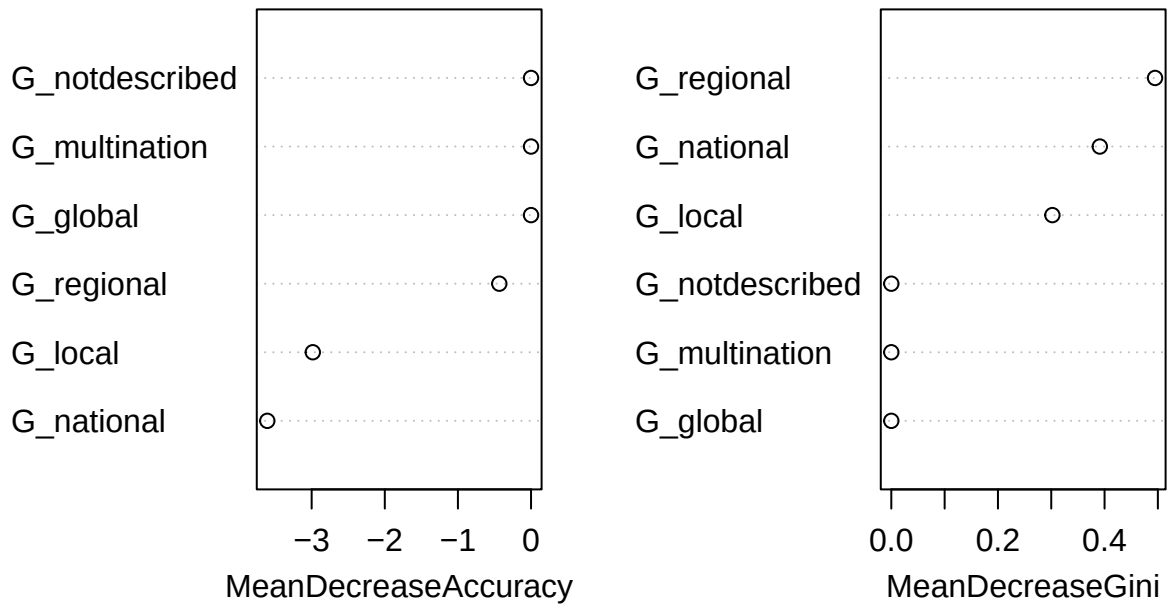
```
##
## Call:
##  randomForest(formula = solution_proposed_YN ~ G_notdescribed +      G_local + G_regional + G_nationa
##                Type of random forest: classification
##                      Number of trees: 500
## No. of variables tried at each split: 2
##
##         OOB estimate of  error rate: 3.64%
## Confusion matrix:
##     N Y class.error
## N 318 0           0
## Y  12 0           1

## Confusion Matrix and Statistics
##
##           Reference
## Prediction   N   Y
##          N 147   6
##          Y   0   0
##
##                Accuracy : 0.9608
##                  95% CI : (0.9166, 0.9855)
##     No Information Rate : 0.9608
##     P-Value [Acc > NIR] : 0.60632
##
##                   Kappa : 0
##
##  Mcnemar's Test P-Value : 0.04123
##
##             Sensitivity : 1.0000
##             Specificity : 0.0000
##          Pos Pred Value : 0.9608
##          Neg Pred Value :    NaN
##              Prevalence : 0.9608
##          Detection Rate : 0.9608
##    Detection Prevalence : 1.0000
##       Balanced Accuracy : 0.5000
##
##        'Positive' Class : N
##
```


No. of Nodes for the Trees
Frequency
0
20
40
60
80
120
2
3
4
5
6
7
8
9
treesize(rf)




```
##                N Y MeanDecreaseAccuracy MeanDecreaseGini
## G_notdescribed 0 0                     0      0.007652842
## G_local        0 0                     0      0.065447728
## G_regional     0 0                     0      0.062428508
## G_national     0 0                     0      0.287483917
## G_multination  0 0                     0      0.031157997
## G_global       0 0                     0      0.011364672
```


Balanced Model − No. of Nodes for the Trees
Frequency
0
50
100
150
200
2.0
2.5
3.0
3.5
4.0
treesize(rf2)




```
##                        N         Y MeanDecreaseAccuracy MeanDecreaseGini
## G_notdescribed  0.000000  0.000000            0.0000000        0.0000000
## G_local         1.254796 -5.645543           -2.9845769        0.3021136
## G_regional      2.870286 -4.609497           -0.4339099        0.4947078
## G_national     -2.420674 -2.591003           -3.6063496        0.3910752
## G_multination   0.000000  0.000000            0.0000000        0.0000000
## G_global        0.000000  0.000000            0.0000000        0.0000000
```

Multivariate Stakeholder Engagement Modeling - geographic area

Regression Testing - stakeholder type vs geographic area - interactions and effects

```
## Response ST_farmers :
##
## Call:
## lm(formula = ST_farmers ~ G_notdescribed + G_local + G_regional +
##     G_national + G_multination + G_global, data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.13957 -0.07417 -0.07417 -0.03995  0.96429
##
## Coefficients:
##                 Estimate Std. Error t value Pr(>|t|)
## (Intercept)     0.004541   0.037574   0.121   0.9039
## G_notdescribed -0.055704   0.124998  -0.446   0.6561
## G_local         0.099621   0.043344   2.298   0.0220 *
## G_regional      0.069625   0.041384   1.682   0.0931 .
## G_national      0.035406   0.046920   0.755   0.4509
## G_multination   0.031173   0.060133   0.518   0.6044
## G_global       -0.004541   0.083801  -0.054   0.9568
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2484 on 476 degrees of freedom
## Multiple R-squared:  0.0168, Adjusted R-squared:  0.00441
## F-statistic: 1.356 on 6 and 476 DF,  p-value: 0.2309
##
##
## Response ST_combined_gov :
##
## Call:
## lm(formula = ST_combined_gov ~ G_notdescribed + G_local + G_regional +
##     G_national + G_multination + G_global, data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.18908 -0.12027 -0.11380 -0.07143  0.94671
##
## Coefficients:
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)     0.05329    0.04662   1.143    0.254
## G_notdescribed -0.10237    0.15510  -0.660    0.510
## G_local         0.06698    0.05378   1.245    0.214
## G_regional      0.06052    0.05135   1.179    0.239
## G_national      0.06881    0.05822   1.182    0.238
## G_multination   0.01814    0.07461   0.243    0.808
## G_global       -0.05329    0.10398  -0.512    0.609
##
## Residual standard error: 0.3083 on 476 degrees of freedom
## Multiple R-squared:  0.008435,   Adjusted R-squared:  -0.004063
## F-statistic: 0.6749 on 6 and 476 DF,  p-value: 0.67
```

```
##
##
## Response ST_tribal :
##
## Call:
## lm(formula = ST_tribal ~ G_notdescribed + G_local + G_regional +
##     G_national + G_multination + G_global, data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.02407 -0.01991 -0.00496 -0.00071  0.99504
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)     0.0007098  0.0137302   0.052    0.959
## G_notdescribed -0.0073807  0.0456767  -0.162    0.872
## G_local         0.0233566  0.0158386   1.475    0.141
## G_regional      0.0042527  0.0151224   0.281    0.779
## G_national     -0.0009257  0.0171455  -0.054    0.957
## G_multination  -0.0007098  0.0219738  -0.032    0.974
## G_global       -0.0007098  0.0306223  -0.023    0.982
##
## Residual standard error: 0.09078 on 476 degrees of freedom
## Multiple R-squared:  0.0111, Adjusted R-squared:  -0.001364
## F-statistic: 0.8906 on 6 and 476 DF,  p-value: 0.5015
##
##
## Response ST_combined_coalition :
##
## Call:
## lm(formula = ST_combined_coalition ~ G_notdescribed + G_local +
##     G_regional + G_national + G_multination + G_global, data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.09636 -0.04945 -0.04945 -0.03179  0.96821
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)     0.003125   0.030220   0.103   0.9177
## G_notdescribed -0.038014   0.100535  -0.378   0.7055
## G_local         0.028663   0.034861   0.822   0.4114
## G_regional      0.046323   0.033285   1.392   0.1647
## G_national      0.064569   0.037738   1.711   0.0877 .
## G_multination   0.032589   0.048365   0.674   0.5007
## G_global       -0.003125   0.067400  -0.046   0.9630
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1998 on 476 degrees of freedom
## Multiple R-squared:  0.008745,   Adjusted R-squared:  -0.00375
## F-statistic: 0.6999 on 6 and 476 DF,  p-value: 0.6498
##
##
```

```
## Response ST_combined_industry :
##
## Call:
## lm(formula = ST_combined_industry ~ G_notdescribed + G_local +
##     G_regional + G_national + G_multination + G_global, data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.27272 -0.08285 -0.08285 -0.07800  0.97754
##
## Coefficients:
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)     0.02246    0.03920   0.573    0.567
## G_notdescribed  0.18133    0.13039   1.391    0.165
## G_local         0.05554    0.04521   1.228    0.220
## G_regional      0.06039    0.04317   1.399    0.162
## G_national      0.06894    0.04895   1.408    0.160
## G_multination  -0.02246    0.06273  -0.358    0.721
## G_global       -0.02246    0.08742  -0.257    0.797
##
## Residual standard error: 0.2592 on 476 degrees of freedom
## Multiple R-squared:  0.01527,    Adjusted R-squared:  0.002858
## F-statistic:  1.23 on 6 and 476 DF,  p-value: 0.2892
##
##
## Response ST_migrants :
##
## Call:
## lm(formula = ST_migrants ~ G_notdescribed + G_local + G_regional +
##     G_national + G_multination + G_global, data = crcdata)
##
## Residuals:
##    Min     1Q Median     3Q    Max
##      0      0      0      0      0
##
## Coefficients:
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)           0          0     NaN      NaN
## G_notdescribed        0          0     NaN      NaN
## G_local               0          0     NaN      NaN
## G_regional            0          0     NaN      NaN
## G_national            0          0     NaN      NaN
## G_multination         0          0     NaN      NaN
## G_global              0          0     NaN      NaN
##
## Residual standard error: 0 on 476 degrees of freedom
## Multiple R-squared:    NaN,  Adjusted R-squared:    NaN
## F-statistic:   NaN on 6 and 476 DF,  p-value: NA
##
##
## Response ST_youth :
##
## Call:
## lm(formula = ST_youth ~ G_notdescribed + G_local + G_regional +
```

```
##     G_national + G_multination + G_global, data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.01605 -0.01574 -0.00495 -0.00048  0.99505
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)     0.0004829  0.0119327   0.040    0.968
## G_notdescribed -0.0053362  0.0396970  -0.134    0.893
## G_local         0.0155648  0.0137651   1.131    0.259
## G_regional      0.0044695  0.0131427   0.340    0.734
## G_national     -0.0006211  0.0149009  -0.042    0.967
## G_multination  -0.0004829  0.0190971  -0.025    0.980
## G_global       -0.0004829  0.0266133  -0.018    0.986
##
## Residual standard error: 0.0789 on 476 degrees of freedom
## Multiple R-squared:  0.006176,   Adjusted R-squared:  -0.006351
## F-statistic: 0.493 on 6 and 476 DF,  p-value: 0.8137
##
##
## Response ST_public :
##
## Call:
## lm(formula = ST_public ~ G_notdescribed + G_local + G_regional +
##     G_national + G_multination + G_global, data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.06458 -0.04810 -0.02482 -0.01380  0.98620
##
## Coefficients:
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)     0.04810    0.02707   1.777   0.0763 .
## G_notdescribed -0.03782    0.09006  -0.420   0.6747
## G_local         0.01648    0.03123   0.528   0.5979
## G_regional     -0.02328    0.02982  -0.781   0.4353
## G_national     -0.03429    0.03380  -1.014   0.3109
## G_multination  -0.04810    0.04332  -1.110   0.2675
## G_global       -0.04810    0.06038  -0.797   0.4261
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.179 on 476 degrees of freedom
## Multiple R-squared:  0.01426,    Adjusted R-squared:  0.001839
## F-statistic: 1.148 on 6 and 476 DF,  p-value: 0.3333
##
##
## Response ST_university :
##
## Call:
## lm(formula = ST_university ~ G_notdescribed + G_local + G_regional +
##     G_national + G_multination + G_global, data = crcdata)
##
```

```
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.10030 -0.05938 -0.05938 -0.03188  0.97317
##
## Coefficients:
##                 Estimate Std. Error t value Pr(>|t|)
## (Intercept)     0.026829   0.033556   0.800    0.424
## G_notdescribed -0.053333   0.111632  -0.478    0.633
## G_local         0.005051   0.038709   0.130    0.896
## G_regional      0.032547   0.036958   0.881    0.379
## G_national      0.068418   0.041903   1.633    0.103
## G_multination   0.008886   0.053703   0.165    0.869
## G_global       -0.026829   0.074839  -0.358    0.720
##
## Residual standard error: 0.2219 on 476 degrees of freedom
## Multiple R-squared:  0.01161,    Adjusted R-squared:  -0.0008453
## F-statistic: 0.9322 on 6 and 476 DF,  p-value: 0.4714
##
##
## Response ST_experts :
##
## Call:
## lm(formula = ST_experts ~ G_notdescribed + G_local + G_regional +
##     G_national + G_multination + G_global, data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.05472 -0.04939 -0.04072 -0.01591  0.98409
##
## Coefficients:
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)     0.00190    0.02713   0.070    0.944
## G_notdescribed -0.02698    0.09026  -0.299    0.765
## G_local         0.01401    0.03130   0.448    0.655
## G_regional      0.04749    0.02988   1.589    0.113
## G_national      0.03882    0.03388   1.146    0.252
## G_multination   0.03381    0.04342   0.779    0.436
## G_global       -0.00190    0.06051  -0.031    0.975
##
## Residual standard error: 0.1794 on 476 degrees of freedom
## Multiple R-squared:  0.009928,   Adjusted R-squared:  -0.002552
## F-statistic: 0.7955 on 6 and 476 DF,  p-value: 0.5737
```

Multivariate Geographic Modeling - Ghodsvali

Regression Testing - Geographic area vs engagment (Ghodsvali) - interactions and effects

```
## Response G_notdescribed :
##
## Call:
## lm(formula = G_notdescribed ~ STE_G_nominal + STE_G_instrumental +
##     STE_G_representation + STE_G_transformative, data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.01008 -0.01008 -0.01008 -0.01008  0.98992
##
## Coefficients:
##                        Estimate Std. Error t value Pr(>|t|)
## (Intercept)            0.010076   0.004568   2.206   0.0279 *
## STE_G_nominal         -0.010076   0.017797  -0.566   0.5716
## STE_G_instrumental    -0.010076   0.015455  -0.652   0.5148
## STE_G_representation  -0.010076   0.027820  -0.362   0.7174
## STE_G_transformative  -0.010076   0.030681  -0.328   0.7428
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.09102 on 478 degrees of freedom
## Multiple R-squared:  0.001809,   Adjusted R-squared:  -0.006544
## F-statistic: 0.2166 on 4 and 478 DF,  p-value: 0.9292
##
##
## Response G_local :
##
## Call:
## lm(formula = G_local ~ STE_G_nominal + STE_G_instrumental + STE_G_representation +
##     STE_G_transformative, data = crcdata)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.5556 -0.2343 -0.2343  0.4444  0.8182
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)            0.23426    0.02176  10.763  < 2e-16 ***
## STE_G_nominal          0.26574    0.08479   3.134  0.00183 **
## STE_G_instrumental     0.05522    0.07364   0.750  0.45371
## STE_G_representation -0.05244    0.13255  -0.396  0.69256
## STE_G_transformative   0.32130    0.14618   2.198  0.02843 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4336 on 478 degrees of freedom
## Multiple R-squared:  0.02981,    Adjusted R-squared:  0.02169
## F-statistic: 3.671 on 4 and 478 DF,  p-value: 0.005873
```

```
##
##
## Response G_regional :
##
## Call:
## lm(formula = G_regional ~ STE_G_nominal + STE_G_instrumental +
##     STE_G_representation + STE_G_transformative, data = crcdata)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.5454 -0.4156 -0.4156  0.5844  0.8889
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)            0.41562    0.02477  16.782   <2e-16 ***
## STE_G_nominal          0.01295    0.09649   0.134   0.8933
## STE_G_instrumental     0.08438    0.08379   1.007   0.3144
## STE_G_representation   0.12984    0.15083   0.861   0.3898
## STE_G_transformative -0.30451    0.16634  -1.831   0.0678 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4935 on 478 degrees of freedom
## Multiple R-squared:  0.01092,    Adjusted R-squared:  0.00264
## F-statistic: 1.319 on 4 and 478 DF,  p-value: 0.2619
##
##
## Response G_national :
##
## Call:
## lm(formula = G_national ~ STE_G_nominal + STE_G_instrumental +
##     STE_G_representation + STE_G_transformative, data = crcdata)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.2727 -0.1587 -0.1587 -0.1579  0.8421
##
## Coefficients:
##                         Estimate Std. Error t value Pr(>|t|)
## (Intercept)            0.1586902  0.0180451   8.794   <2e-16 ***
## STE_G_nominal         -0.1586902  0.0703031  -2.257   0.0244 *
## STE_G_instrumental    -0.0007954  0.0610536  -0.013   0.9896
## STE_G_representation   0.1140371  0.1098987   1.038   0.3000
## STE_G_transformative   0.0635320  0.1211994   0.524   0.6004
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3595 on 478 degrees of freedom
## Multiple R-squared:  0.01388,    Adjusted R-squared:  0.005632
## F-statistic: 1.682 on 4 and 478 DF,  p-value: 0.1528
##
##
## Response G_multination :
##
```

```
## Call:
## lm(formula = G_multination ~ STE_G_nominal + STE_G_instrumental +
##     STE_G_representation + STE_G_transformative, data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.11111 -0.06297 -0.06297 -0.06297  0.97368
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)            0.06297    0.01176   5.354 1.34e-07 ***
## STE_G_nominal         -0.02726    0.04582  -0.595    0.552
## STE_G_instrumental    -0.03666    0.03980  -0.921    0.357
## STE_G_representation -0.06297    0.07163  -0.879    0.380
## STE_G_transformative  0.04814    0.07900   0.609    0.543
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2344 on 478 degrees of freedom
## Multiple R-squared:  0.004711,   Adjusted R-squared:  -0.003618
## F-statistic: 0.5656 on 4 and 478 DF,  p-value: 0.6877
##
##
## Response G_global :
##
## Call:
## lm(formula = G_global ~ STE_G_nominal + STE_G_instrumental +
##     STE_G_representation + STE_G_transformative, data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.02771 -0.02771 -0.02771 -0.02771  0.97229
##
## Coefficients:
##                        Estimate Std. Error t value Pr(>|t|)
## (Intercept)            0.027708   0.007507   3.691 0.000249 ***
## STE_G_nominal         -0.027708   0.029248  -0.947 0.343949
## STE_G_instrumental    -0.027708   0.025400  -1.091 0.275890
## STE_G_representation -0.027708   0.045721  -0.606 0.544793
## STE_G_transformative -0.027708   0.050423  -0.550 0.582913
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1496 on 478 degrees of freedom
## Multiple R-squared:  0.005048,   Adjusted R-squared:  -0.003277
## F-statistic: 0.6064 on 4 and 478 DF,  p-value: 0.6582
```

Multivariate Geographic Modeling - IAP2

Regression Testing - Geographic area vs engagment (IAP2) - interactions and effects

```
## Response G_notdescribed :
##
## Call:
## lm(formula = G_notdescribed ~ STE_IAP2_data_gathering + STE_IAP2_inform +
##     STE_IAP2_consult + STE_IAP2_involve + STE_IAP2_collab + STE_IAP2_empower,
##     data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.01008 -0.01008 -0.01008 -0.01008  0.98992
##
## Coefficients:
##                           Estimate Std. Error t value Pr(>|t|)
## (Intercept)               0.010076   0.004578   2.201   0.0282 *
## STE_IAP2_data_gathering -0.010076   0.016760  -0.601   0.5480
## STE_IAP2_inform         -0.010076   0.091322  -0.110   0.9122
## STE_IAP2_consult        -0.010076   0.016524  -0.610   0.5423
## STE_IAP2_involve        -0.010076   0.034776  -0.290   0.7721
## STE_IAP2_collab         -0.010076   0.034776  -0.290   0.7721
## STE_IAP2_empower        -0.010076   0.037515  -0.269   0.7884
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.09121 on 476 degrees of freedom
## Multiple R-squared:  0.001809,   Adjusted R-squared:  -0.01077
## F-statistic: 0.1438 on 6 and 476 DF,  p-value: 0.9902
##
##
## Response G_local :
##
## Call:
## lm(formula = G_local ~ STE_IAP2_data_gathering + STE_IAP2_inform +
##     STE_IAP2_consult + STE_IAP2_involve + STE_IAP2_collab + STE_IAP2_empower,
##     data = crcdata)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.8333 -0.2343 -0.2343  0.1667  0.7657
##
## Coefficients:
##                          Estimate Std. Error t value Pr(>|t|)
## (Intercept)               0.23426    0.02158  10.856  < 2e-16 ***
## STE_IAP2_data_gathering  0.23449    0.07901   2.968 0.003149 **
## STE_IAP2_inform           0.76574    0.43049   1.779 0.075913 .
## STE_IAP2_consult          0.03847    0.07789   0.494 0.621612
## STE_IAP2_involve          0.05146    0.16393   0.314 0.753737
## STE_IAP2_collab          -0.23426    0.16393  -1.429 0.153660
## STE_IAP2_empower          0.59908    0.17685   3.388 0.000764 ***
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4299 on 476 degrees of freedom
## Multiple R-squared:  0.0503, Adjusted R-squared:  0.03832
## F-statistic: 4.201 on 6 and 476 DF,  p-value: 0.0003936
##
##
## Response G_regional :
##
## Call:
## lm(formula = G_regional ~ STE_IAP2_data_gathering + STE_IAP2_inform +
##     STE_IAP2_consult + STE_IAP2_involve + STE_IAP2_collab + STE_IAP2_empower,
##     data = crcdata)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.5714 -0.4156 -0.4156  0.5844  0.5938
##
## Coefficients:
##                           Estimate Std. Error t value Pr(>|t|)
## (Intercept)               0.415617   0.024749  16.793   <2e-16 ***
## STE_IAP2_data_gathering -0.009367   0.090619  -0.103    0.918
## STE_IAP2_inform         -0.415617   0.493751  -0.842    0.400
## STE_IAP2_consult         0.129837   0.089339   1.453    0.147
## STE_IAP2_involve         0.155811   0.188022   0.829    0.408
## STE_IAP2_collab          0.012954   0.188022   0.069    0.945
## STE_IAP2_empower        -0.415617   0.202835  -2.049    0.041 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4931 on 476 degrees of freedom
## Multiple R-squared:  0.01639,    Adjusted R-squared:  0.003992
## F-statistic: 1.322 on 6 and 476 DF,  p-value: 0.2456
##
##
## Response G_national :
##
## Call:
## lm(formula = G_national ~ STE_IAP2_data_gathering + STE_IAP2_inform +
##     STE_IAP2_consult + STE_IAP2_involve + STE_IAP2_collab + STE_IAP2_empower,
##     data = crcdata)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.4286 -0.1587 -0.1587 -0.1515  0.9688
##
## Coefficients:
##                           Estimate Std. Error t value Pr(>|t|)
## (Intercept)               0.158690   0.018057   8.788   <2e-16 ***
## STE_IAP2_data_gathering -0.127440   0.066117  -1.928   0.0545 .
## STE_IAP2_inform         -0.158690   0.360245  -0.441   0.6598
## STE_IAP2_consult        -0.007175   0.065183  -0.110   0.9124
## STE_IAP2_involve        -0.015833   0.137182  -0.115   0.9082
```

```
## STE_IAP2_collab          0.269881   0.137182   1.967   0.0497 *
## STE_IAP2_empower         0.007976   0.147990   0.054   0.9570
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3598 on 476 degrees of freedom
## Multiple R-squared:  0.01666,    Adjusted R-squared:  0.004267
## F-statistic: 1.344 on 6 and 476 DF,  p-value: 0.2358
##
##
## Response G_multination :
##
## Call:
## lm(formula = G_multination ~ STE_IAP2_data_gathering + STE_IAP2_inform +
##     STE_IAP2_consult + STE_IAP2_involve + STE_IAP2_collab + STE_IAP2_empower,
##     data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.14286 -0.06297 -0.06297 -0.06297  0.93750
##
## Coefficients:
##                           Estimate Std. Error t value Pr(>|t|)
## (Intercept)              0.0629723  0.0117653   5.352 1.35e-07 ***
## STE_IAP2_data_gathering -0.0004723  0.0430780  -0.011    0.991
## STE_IAP2_inform         -0.0629723  0.2347165  -0.268    0.789
## STE_IAP2_consult        -0.0629723  0.0424697  -1.483    0.139
## STE_IAP2_involve        -0.0629723  0.0893807  -0.705    0.481
## STE_IAP2_collab          0.0798849  0.0893807   0.894    0.372
## STE_IAP2_empower        -0.0629723  0.0964227  -0.653    0.514
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2344 on 476 degrees of freedom
## Multiple R-squared:  0.008302,   Adjusted R-squared:  -0.004199
## F-statistic: 0.6641 on 6 and 476 DF,  p-value: 0.6787
##
##
## Response G_global :
##
## Call:
## lm(formula = G_global ~ STE_IAP2_data_gathering + STE_IAP2_inform +
##     STE_IAP2_consult + STE_IAP2_involve + STE_IAP2_collab + STE_IAP2_empower,
##     data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.02771 -0.02771 -0.02771 -0.02771  0.97229
##
## Coefficients:
##                           Estimate Std. Error t value Pr(>|t|)
## (Intercept)              0.027708   0.007523   3.683 0.000257 ***
## STE_IAP2_data_gathering -0.027708   0.027545  -1.006 0.314977
## STE_IAP2_inform         -0.027708   0.150085  -0.185 0.853610
```

```
## STE_IAP2_consult        -0.027708   0.027156  -1.020 0.308103
## STE_IAP2_involve        -0.027708   0.057153  -0.485 0.628040
## STE_IAP2_collab         -0.027708   0.057153  -0.485 0.628040
## STE_IAP2_empower        -0.027708   0.061656  -0.449 0.653351
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1499 on 476 degrees of freedom
## Multiple R-squared:  0.005048,   Adjusted R-squared:  -0.007493
## F-statistic: 0.4025 on 6 and 476 DF,  p-value: 0.8774
```

Multivariate Geographic Modeling - Local

Regression Testing - Geographic area vs engagment (local) - interactions and effects

```
## Response G_notdescribed :
##
## Call:
## lm(formula = G_notdescribed ~ SC_researcher + SC_datagathering +
##     SC_inform + SC_perspectives + SC_plan + SC_identify + SC_envision +
##     SC_implement, data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.01003 -0.01003 -0.01003 -0.01003  0.98997
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)       0.010034   0.004578   2.192   0.0289 *
## SC_researcher    -0.009466   0.017041  -0.555   0.5788
## SC_datagathering -0.009477   0.022607  -0.419   0.6752
## SC_inform        -0.010034   0.045929  -0.218   0.8272
## SC_perspectives  -0.010034   0.091516  -0.110   0.9127
## SC_plan          -0.010034   0.027936  -0.359   0.7196
## SC_identify      -0.010034   0.022024  -0.456   0.6489
## SC_envision      -0.010034   0.091516  -0.110   0.9127
## SC_implement     -0.008141   0.041176  -0.198   0.8434
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0914 on 474 degrees of freedom
## Multiple R-squared:  0.001767,   Adjusted R-squared:  -0.01508
## F-statistic: 0.1049 on 8 and 474 DF,  p-value: 0.9991
##
##
## Response G_local :
##
## Call:
## lm(formula = G_local ~ SC_researcher + SC_datagathering + SC_inform +
##     SC_perspectives + SC_plan + SC_identify + SC_envision + SC_implement,
##     data = crcdata)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.7622 -0.2350 -0.2350  0.5093  0.7650
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)       0.23503    0.02182  10.770   <2e-16 ***
## SC_researcher     0.20270    0.08124   2.495   0.0129 *
## SC_datagathering  0.10599    0.10776   0.984   0.3258
## SC_inform        -0.23503    0.21894  -1.073   0.2836
## SC_perspectives  -0.23503    0.43625  -0.539   0.5903
```

```
## SC_plan           0.03770    0.13317   0.283   0.7772
## SC_identify       0.15386    0.10499   1.465   0.1435
## SC_envision      -0.23503    0.43625  -0.539   0.5903
## SC_implement      0.32443    0.19629   1.653   0.0990 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4357 on 474 degrees of freedom
## Multiple R-squared:  0.02877,    Adjusted R-squared:  0.01238
## F-statistic: 1.755 on 8 and 474 DF,  p-value: 0.08374
##
##
## Response G_regional :
##
## Call:
## lm(formula = G_regional ~ SC_researcher + SC_datagathering +
##     SC_inform + SC_perspectives + SC_plan + SC_identify + SC_envision +
##     SC_implement, data = crcdata)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.7500 -0.4150 -0.4150  0.5850  0.8489
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)       0.41496    0.02472  16.790   <2e-16 ***
## SC_researcher    -0.06119    0.09201  -0.665   0.5063
## SC_datagathering  0.23569    0.12205   1.931   0.0541 .
## SC_inform         0.33504    0.24797   1.351   0.1773
## SC_perspectives   0.58504    0.49409   1.184   0.2370
## SC_plan          -0.05133    0.15083  -0.340   0.7338
## SC_identify       0.02948    0.11891   0.248   0.8043
## SC_envision      -0.41496    0.49409  -0.840   0.4014
## SC_implement     -0.20273    0.22231  -0.912   0.3623
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4935 on 474 degrees of freedom
## Multiple R-squared:  0.01917,    Adjusted R-squared:  0.002619
## F-statistic: 1.158 on 8 and 474 DF,  p-value: 0.3229
##
##
## Response G_national :
##
## Call:
## lm(formula = G_national ~ SC_researcher + SC_datagathering +
##     SC_inform + SC_perspectives + SC_plan + SC_identify + SC_envision +
##     SC_implement, data = crcdata)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.2727 -0.1589 -0.1589 -0.1001  0.8999
##
## Coefficients:
```

```
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)       0.158936   0.017990   8.834   <2e-16 ***
## SC_researcher    -0.058851   0.066971  -0.879   0.3800
## SC_datagathering -0.155474   0.088842  -1.750   0.0808 .
## SC_inform        -0.158936   0.180498  -0.881   0.3790
## SC_perspectives  -0.158936   0.359648  -0.442   0.6587
## SC_plan           0.113791   0.109786   1.036   0.3005
## SC_identify       0.007731   0.086554   0.089   0.9289
## SC_envision       0.841064   0.359648   2.339   0.0198 *
## SC_implement      0.052834   0.161819   0.327   0.7442
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3592 on 474 degrees of freedom
## Multiple R-squared:  0.02403,    Adjusted R-squared:  0.007556
## F-statistic: 1.459 on 8 and 474 DF,  p-value: 0.1699
##
##
## Response G_multination :
##
## Call:
## lm(formula = G_multination ~ SC_researcher + SC_datagathering +
##     SC_inform + SC_perspectives + SC_plan + SC_identify + SC_envision +
##     SC_implement, data = crcdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.09091 -0.06300 -0.06300 -0.06300  0.93700
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)       0.06300    0.01178   5.350 1.37e-07 ***
## SC_researcher     0.00563    0.04383   0.128    0.898
## SC_datagathering -0.06333    0.05815  -1.089    0.277
## SC_inform        -0.06300    0.11813  -0.533    0.594
## SC_perspectives  -0.06300    0.23539  -0.268    0.789
## SC_plan           0.02791    0.07185   0.388    0.698
## SC_identify      -0.06300    0.05665  -1.112    0.267
## SC_envision      -0.06300    0.23539  -0.268    0.789
## SC_implement     -0.06412    0.10591  -0.605    0.545
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2351 on 474 degrees of freedom
## Multiple R-squared:  0.00682,    Adjusted R-squared:  -0.009942
## F-statistic: 0.4069 on 8 and 474 DF,  p-value: 0.9167
##
##
## Response G_global :
##
## Call:
## lm(formula = G_global ~ SC_researcher + SC_datagathering + SC_inform +
##     SC_perspectives + SC_plan + SC_identify + SC_envision + SC_implement,
##     data = crcdata)
```

```
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.02759 -0.02759 -0.02759 -0.02759  0.97241
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)       0.027594   0.007524   3.667 0.000273 ***
## SC_researcher    -0.026031   0.028008  -0.929 0.353155
## SC_datagathering -0.026062   0.037155  -0.701 0.483363
## SC_inform        -0.027594   0.075486  -0.366 0.714868
## SC_perspectives  -0.027594   0.150409  -0.183 0.854518
## SC_plan          -0.027594   0.045914  -0.601 0.548137
## SC_identify      -0.027594   0.036198  -0.762 0.446262
## SC_envision      -0.027594   0.150409  -0.183 0.854518
## SC_implement     -0.022387   0.067675  -0.331 0.740935
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1502 on 474 degrees of freedom
## Multiple R-squared:  0.004932,   Adjusted R-squared:  -0.01186
## F-statistic: 0.2936 on 8 and 474 DF,  p-value: 0.968
```