

# Barriers to FOSS4G Adoption

## OSGeo-Live case study

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# Definitions

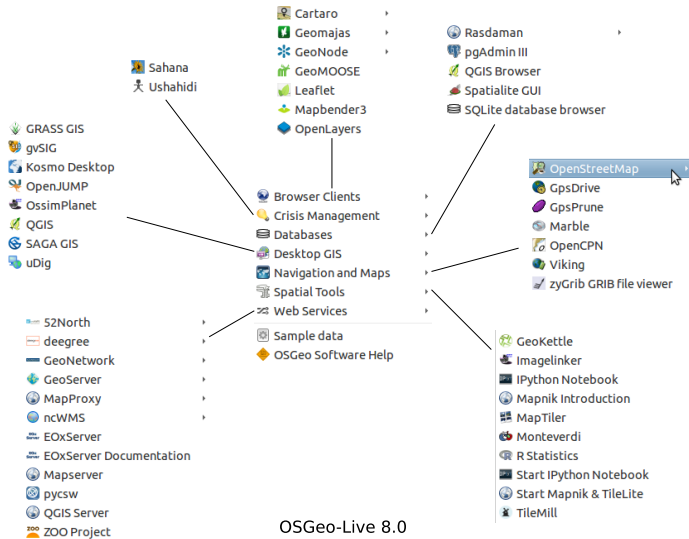
- ▶ Knowledge Diffusion
  - ▶ spread of awareness of an innovation
- ▶ Adoption
  - ▶ actual implementation of knowledge, innovation, or product
- ▶ Barrier
  - ▶ something that slows the rate of diffusion or adoption <sup>1</sup>
- ▶ Pro-innovation Bias
  - ▶ tendency to cast diffusion and adoption as positives

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<sup>1</sup>Barrier is a negative term, as opposed to studying how to increase rates.



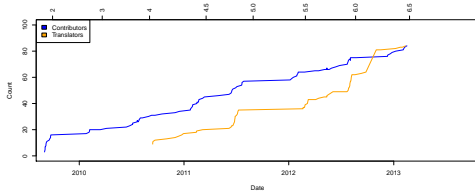
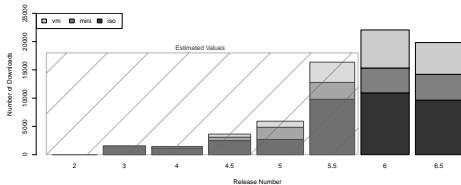
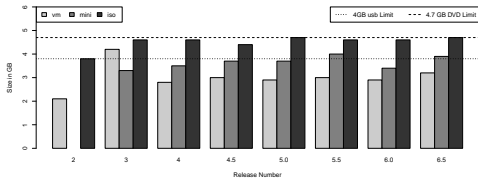
# OSGeo-Live



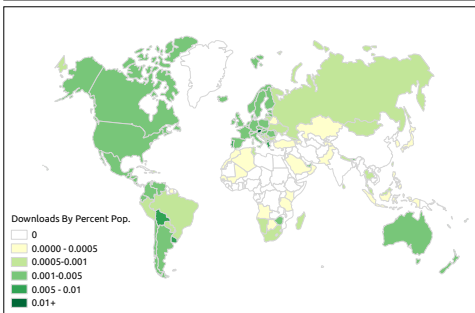
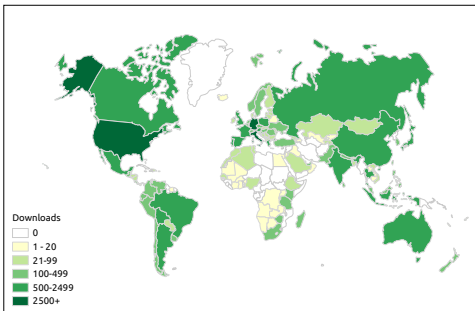
OSGeo-Live 8.0  
*Portland*



# History



# Maps



# OSGeo-Live Downloads: Top 10 Countries

(Versions 6.0 & 6.5)

**Table:** Total Downloads

<b>Country</b>	<b>Downloads</b>
United States	5171
Germany	3385
Italy	2634
Argentina	1812
Mexico	1786
Spain	1533
France	1427
Brazil	1245
Indonesia	1162
United Kingdom	1041

**Table:** Downloads by Percent Population

<b>Country</b>	<b>Pop. Percent</b>	<b>Downloads</b>
New Caledonia	0.016268	37
Austria	0.011205	920
Singapore	0.010070	469
Cape Verde	0.009779	42
Montenegro	0.008629	58
Portugal	0.006967	746
Northern Mariana	0.006767	6
Monaco	0.006067	2
Guernsey	0.005828	4
Uruguay	0.005380	188



# Breakdown

## Linux

Table: Total Downloads

Country	Count	Percent
United States	831	16.070393
Italy	661	25.094913
Germany	575	16.986706
Brazil	394	31.646586
Argentina	358	19.757174
Spain	353	23.026745
Austria	352	38.260870
Canada	348	36.287800
France	329	23.055361
Bolivia	293	58.019802

Table: Percent of Country's

Country	Percent	Count
Tanzania	97.902098	140
Cyprus	92.307692	12
Estonia	84.090909	37
Cape Verde	71.428571	30
Kenya	65.540541	97
Madagascar	64.912281	74
Armenia	62.500000	5
Bolivia	58.019802	293
Venezuela	50.395778	191
Ireland	44.444444	44

## Mac

Table: Total Downloads

Country	Count	Percent
United States	615	11.893251
Singapore	423	90.191898
Germany	167	4.933530
France	132	9.250175
Indonesia	122	10.499139
Italy	108	4.100228
United Kingdom	101	9.702209
South Africa	100	28.653295
Canada	87	9.071950
Spain	87	5.675147

Table: Percent of Country's

Country	Percent	Count
Singapore	90.191898	423
Senegal	53.731343	36
South Africa	28.653295	100
Australia	15.445545	78
Switzerland	14.137931	41
Mali	13.333333	2
Japan	12.915851	66
Finland	12.857143	9
Qatar	12.500000	1
Hong Kong	12.195122	5



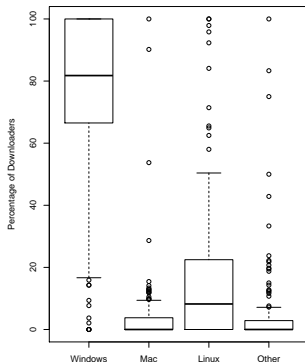
# Significant Variation

Table: World Internet connected desktop computers vs. OSGeo-Live downloaders.\*

	Windows	Mac	Linux	Other
Desktop Computers	92.02000	6.810000	1.16000	0.000000
OSGeo-Live Downloaders	68.6487	6.581052	20.78151	3.988733

Table: Operating System vs. OSGeo-Live variant downloaded.\*

	vm	iso	mini
Windows	8290	14822	5647
Mac	1435	818	504
Linux	2241	4031	2434
Other	385	907	379

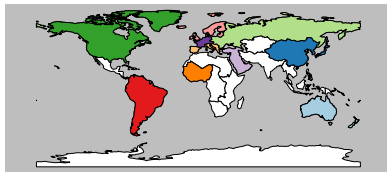
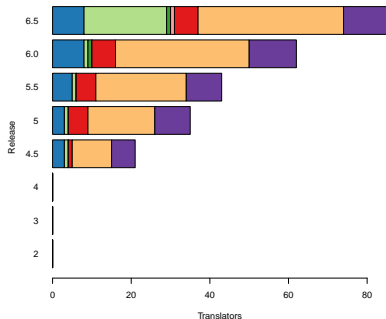
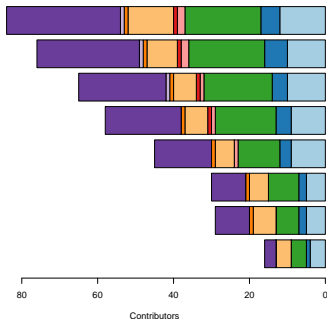


\*Contingency table G-Statistic significant.





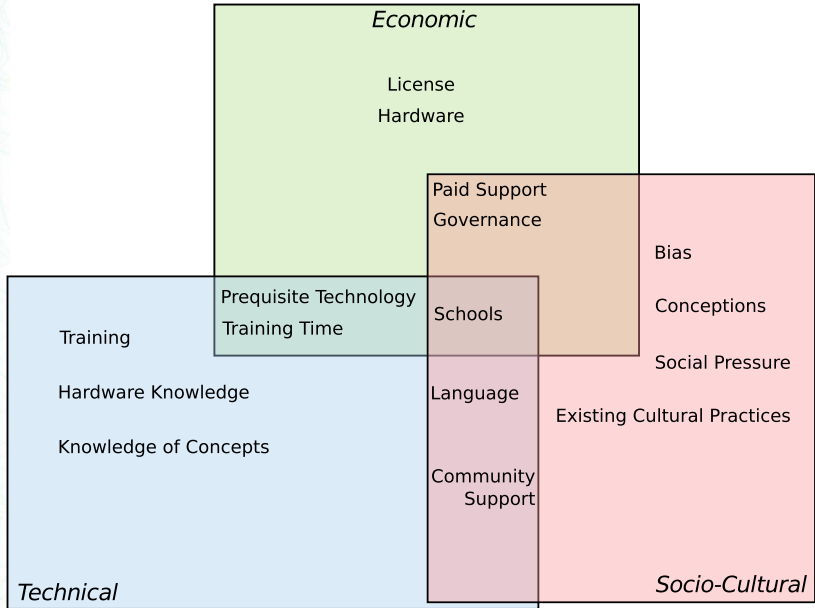
# Regional Participation



Kendall's Rank Correlation, strong correlation, downloaders and participants  $\tau = 0.436$  (p-value = 3.668e-12)



# Barriers



# Potential Barriers

Variable	Description	Source
downloads	Total Number of Downloads	OSGeo-Live
pop	Population	Natural Earth
downbypop	Downloads/Population	calculated
economy	Economic ranking 1-7	Natural Earth (UN)
income	Income ranking 1-5	Natural Earth (UN)
OoklaAverage	Average Internet speed	Ookla
ITUbroadband	Population % wired Internet above 256 kpbs	ITU
AkUniqueIP	Total Unique IP Addresses	Akamai
AkAverage	Average Internet Speed	Akamai
AkPeak	Peak Internet Speed	Akamai
AkHighBroadband	Population % wired Internet above 10 Mbps	Akamai
AkBroadband	Population % wired Internet above 4 Mbps	Akamai
AkNarrowband	Population % wired Internet below 4 Mbps	Akamai
DemIndex	Democracy Index	EIU



# Details

**Table:** Economy Classification

1. Developed region: G7
2. Developed region: nonG7
3. Emerging region: BRIC
4. Emerging region: MIKT
5. Emerging region: G20
6. Developing region
7. Least developed region

**Table:** Income Classification

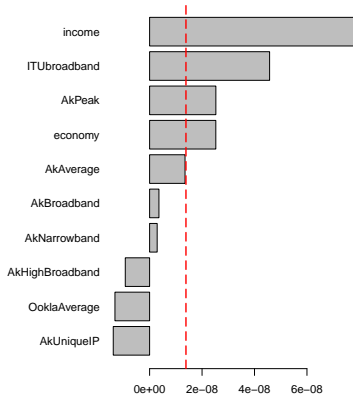
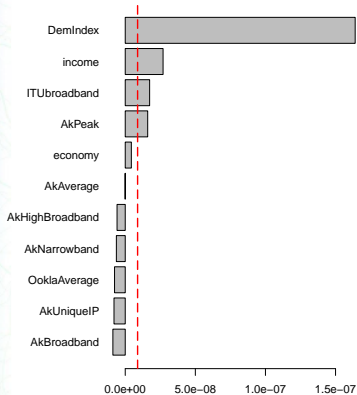
1. High income: OECD
2. High income: nonOECD
3. Upper middle income
4. Lower middle income
5. Low income

## **Listing 1:** Regression Analysis with Random Forests in R

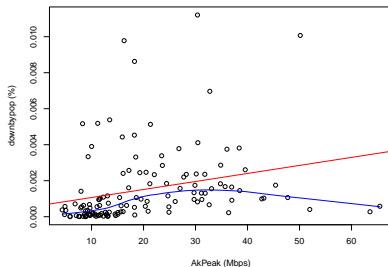
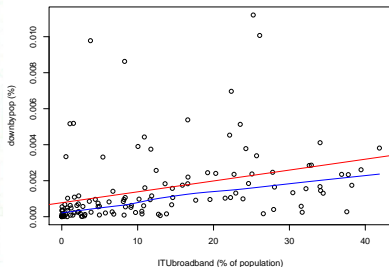
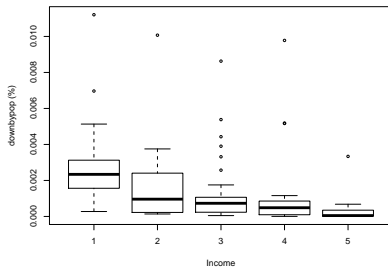
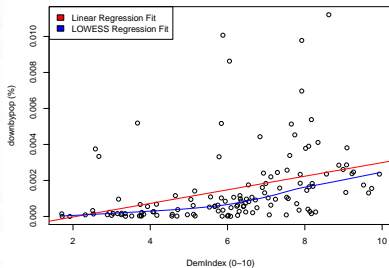
```
#Packages: party, caret, to use multi-core: parallel, doMC
mod1 <- train(downbypop ~ economy+income+OoklaAverage+
  ITUbbroadband+AkUniqueIP+AkAverage+AkPeak+AkHighBroadband
  +AkBroadband+AkNarrowband+DemIndex, data = downdata,
  method = "cforest", trControl = trainControl(method = "
  oob", allowParallel = TRUE, number = 10, repeats = 10),
  controls = cforest_unbiased(ntree = 10000))
test.varimp <- varimp(mod1$finalModel, conditional=TRUE)
```



# Important Variables



# Important Relationships



# Conclusions

- ▶ From the Data
  - ▶ Mac users like Virtual Machines
  - ▶ OSGeo-Live is popular with Linux users
  - ▶ Having participants in the same country corresponds to downloads.
  - ▶ Culture is a big barrier
  - ▶ Fiscal and Technical issues still exist with FOSS
- ▶ Key's to FOSS
  - ▶ Infinite Trial-ability
  - ▶ Re-invention potential
  - ▶ Translation?
  - ▶ Community
    - ▶ Supply Side Institutions (e.g. OSGeo)
    - ▶ Informal Social Networks (e.g. Local Chapters)



# What's Next

- ▶ Confirmation & Details - Survey Questionnaire
- ▶ How fast of internet is good enough?
- ▶ Compare Projects
- ▶ Test more specific data ...
  - ▶ Household income
  - ▶ English Proficiency
  - ▶ % of Higher Education
- ▶ Change over time





# Special Thanks

- ▶ OSGeo-Live Team and Community <http://live.osgeo.org>
- ▶ Jim Quinn and the [Information Center for the Environment](#)

Questions?

<https://github.com/wildintellect/OSGeoLive-analysis>  
@aimandel

