# Thesis Progress Meeting

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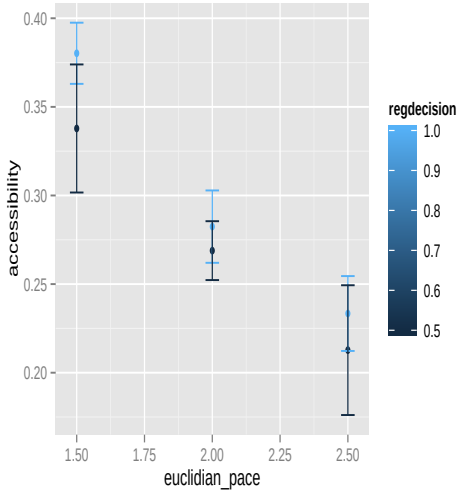
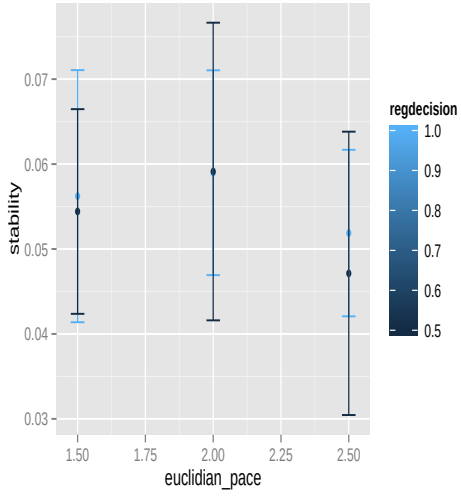
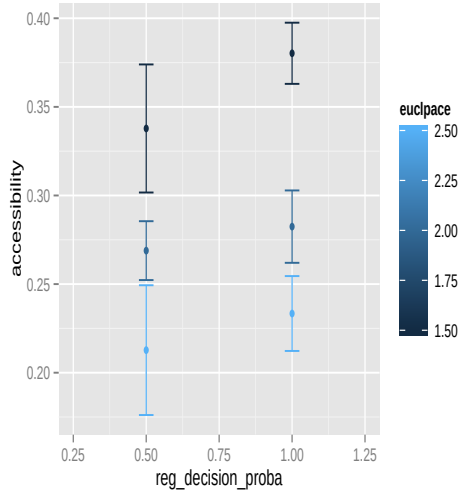
# Achieved Work (by projects)

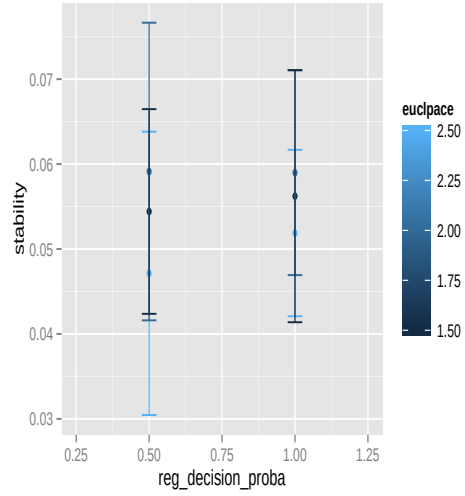
- Conference ICCSS :
  - Conference [1w]
  - Bibliography [0.4w]
  - Poster preparation [0.4w]
- MetropolSim model : Operational version ; first exploration. [1w]
- Space Matters project : coding of morphological indicators and generative models into scala model. [0.4w]
- Network-density statistics : fine systematic study of european urban morphology ; preparation of NW data (direct OSM import). [0.6w]
- Synthetic Data Control : formalisation of the approach. [0.4w]

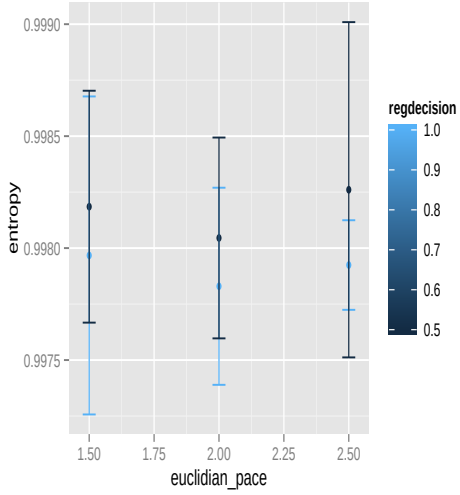
# MetropolSim Model : first exploration results

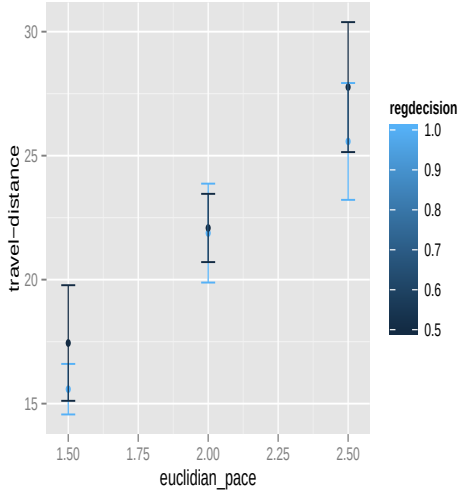


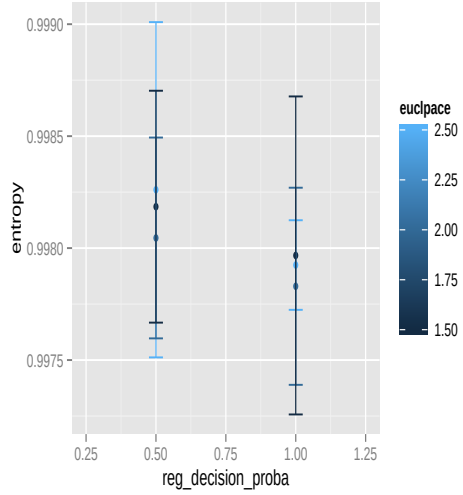



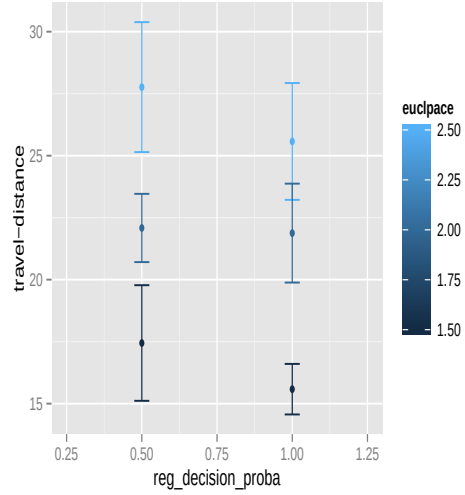



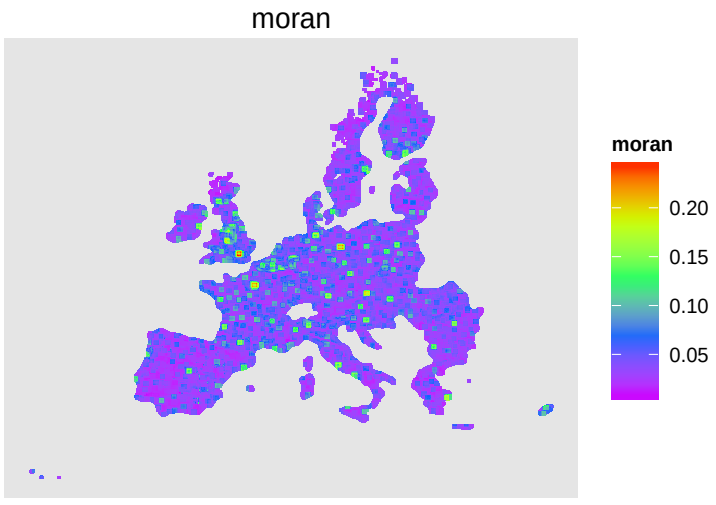



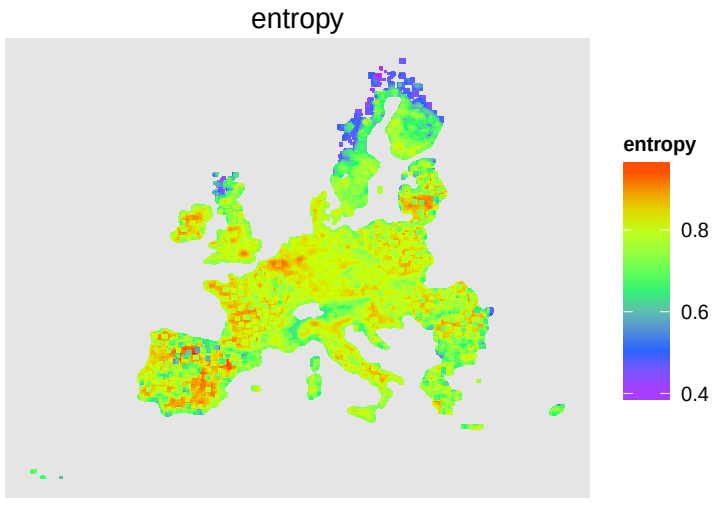
# MetropolSim Model : Next Steps

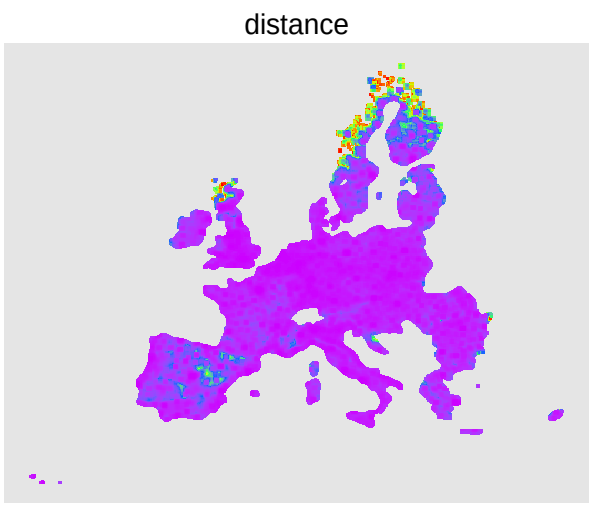
*– TBD ASAP, results for ECTQG –*

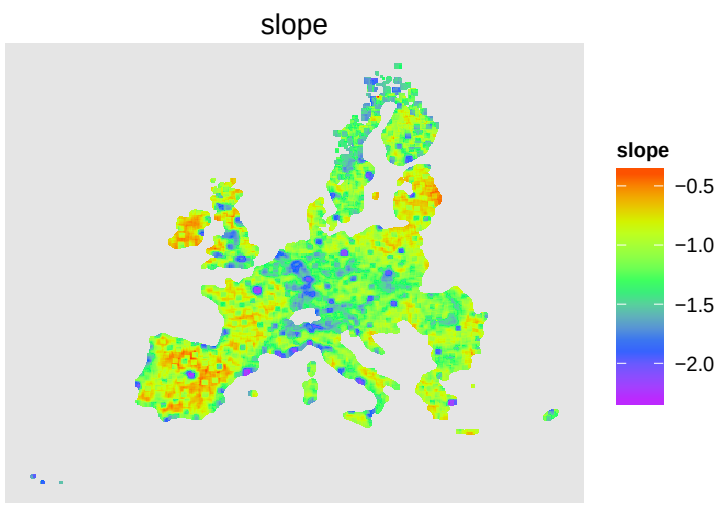
- Validation of exploration heuristic on simple urban shapes.
- Refined exploration heuristic ?
- Qualitative validation compared to typical luti behaviors.
- Exploration of various possibilities for gain game matrix.
- Finer grid exploration.
- Role of infrastructure speed ; link with the emergence of *megacities*.

# Morphological Analysis



# Morphological Analysis : clustering

**k=10**

# Morphological Analysis : next steps

- Systematic study of clustering typology, find consistent cluster size reproducing known typology. Test various scales.
- Analysis on LUZ to validate the method by reproducing Florent results.
- Network data : street network and railways/public transports directly imported from OSM into R.
- Network morphological analysis.
- Coupled statistical analysis of network and urban form, systematically at varying scales [scale is key in our problem].

# Synthetic Data Control : On the utility of the approach

Context : Model $S$ sensitive to initial conditions $I$, that can be produced by an upstream model $U$. We propose to study the sensitivity of $S$ to $I$ by an exploration of $S \circ U$, allowing statistical control on $U$ parameters (let say $\alpha$) and a better knowledge of the differentiate of $S$. One can object

: *Coupling models adds complexity, we do not study the same models. Sensitivity of downstream model can be achieved by the exploration on a large set of I.* $\rightarrow$ precisely, one needs quickly a generative model to be able

to explore a large number of configurations for $I$. $\rightarrow$ furthermore, even

with a dimensionality reduction on $I$ (e.g. morphological classification), one will difficultly know components of its derivative. Whereas studying the coupling allows to know $\partial_\alpha I$ and thus $\partial_I S$, since $\partial_\alpha [S \circ U] = \partial_\alpha S \circ U \times \partial_\alpha U$. $\rightarrow$ We also tackle the overall stochastcity, since $\mathbb{E}[\mathbb{E}[S|I]] = \mathbb{E}[S]$.

# Next steps (until August 15th)

- MetropolSim : cf detailed steps. (ETA 1w)
- Morphology : cf detailed steps. (ETA 1w) ; includes spacematters project.
- Finish Scaling sensitivity project (ETA 0.4w).
- Finish Stochastic Urban Growth Framework project (ETA 0.6w)
- Finish essay (ETA 0.4w)
- Various tasks (publish nldoc, geoopenmod Banos-Doursat model, literature etc). (ETA 0.6w)
- Write mid-year memoire / paper (ETA 2w)