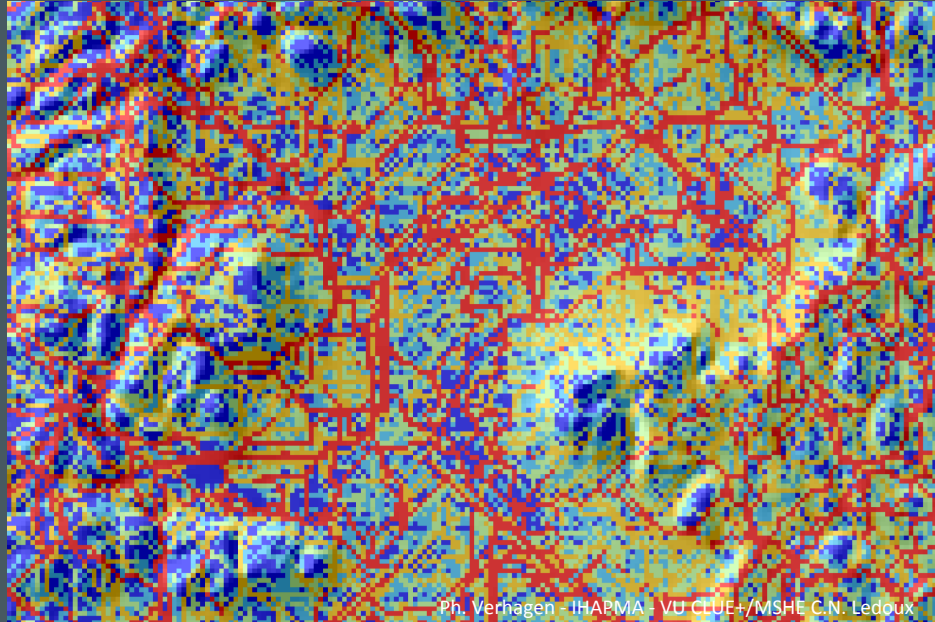# MoveScape
towards a formal representation
of multiple pathway systems

● ● ●

Nuninger Laure - Verhagen Philip - Rodier Xavier
with collab. of R. Opitz and Th. Libourel & MoveScape team
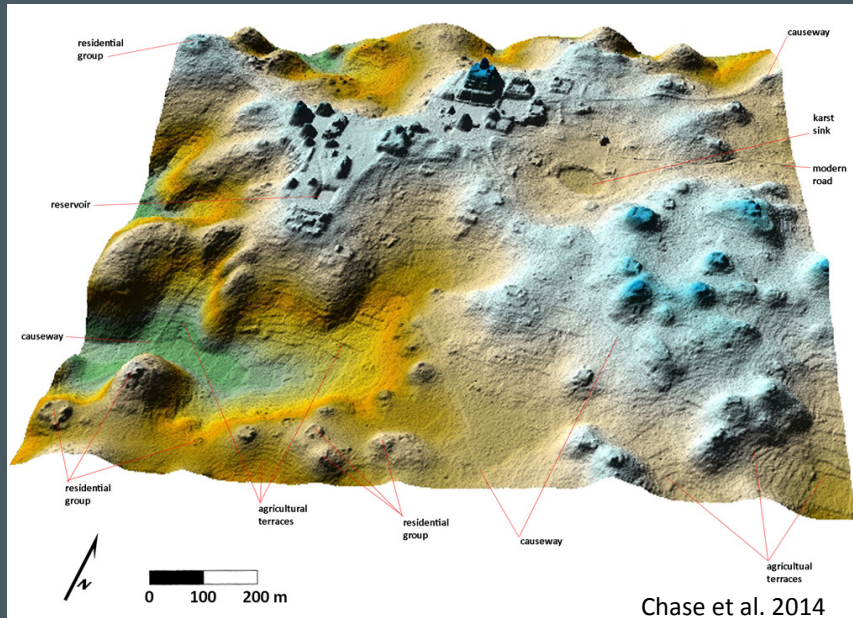
Modelling & Detection of Pathways?

Ph. Verhagen - IHAPMA - VU CLUE+/MSHE C.N. Ledoux

C.. Fruchart - Lieppec / MSHE C.N. Ledoux - ModeLTER

Simulation of potential pathways ⟷ Detection of imprint of pathways

Many pathways and many ways of moving through the landscape

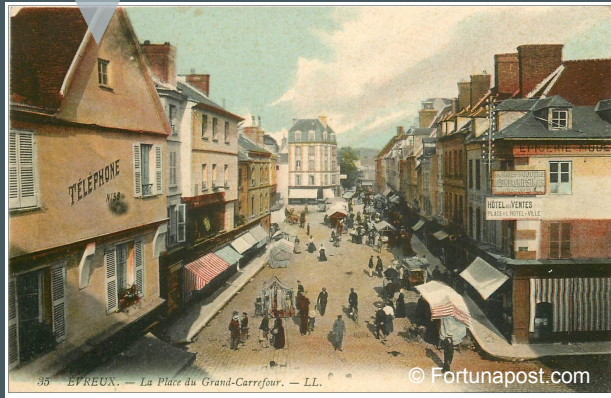https://www.belrando.fr

© cbeaudrey

©Jedediah S. Drolet

http://www.lesamisdebousval.be

Corniches basaltiques de l'Alagnon, Auvergne © cbeaudrey

# Many actors, many ideas of routes

Chase et al. 2014

- Causeways & public spaces network ⇒ "*sacbes*": the most visible part of the transport system - connects elite groups
- Isolated residential groups & agricultural spaces (terraces) ⇒ "*vias*": less visible, intermixed with terraces, connected to main road causeways, connects non-elite groups
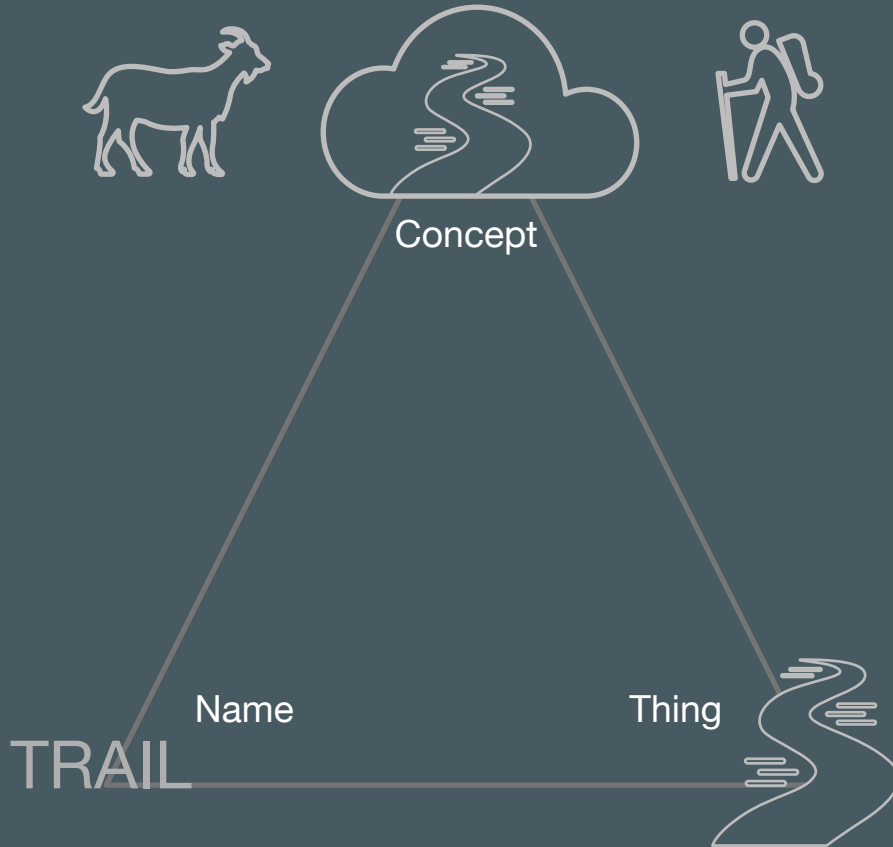
Holloway, John – Track with Sheep Near Lewes
© The Bookroom Art Press
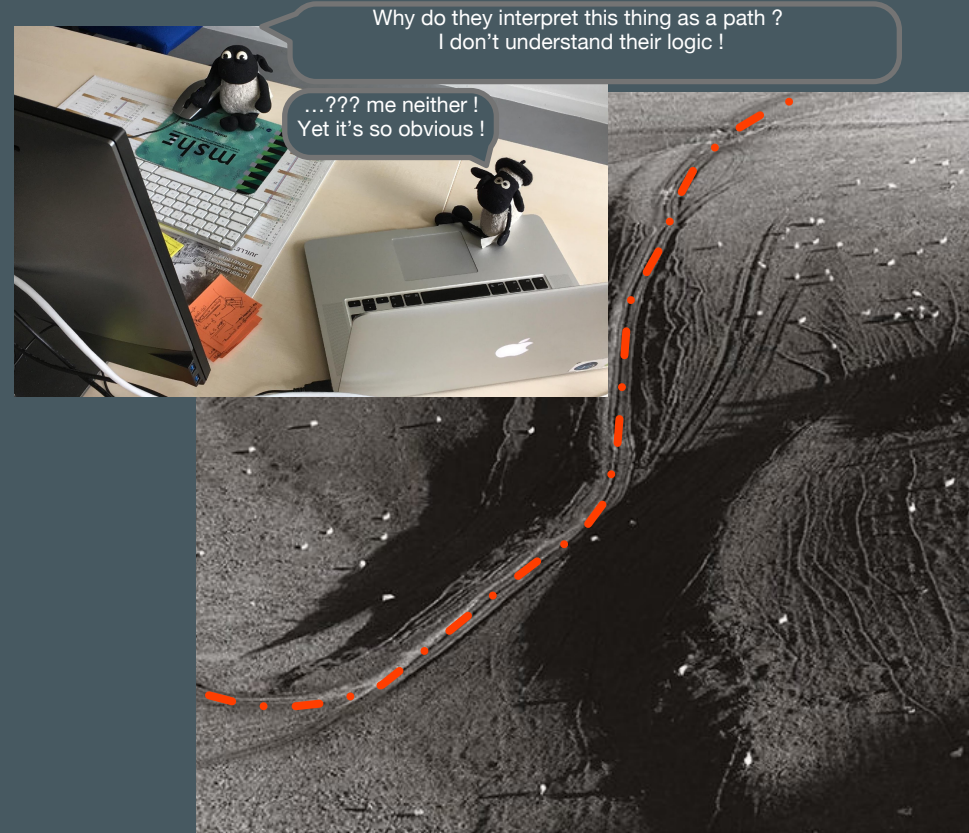
Pathways, Place & Movement: at the crossroad

© Fortunapost.com

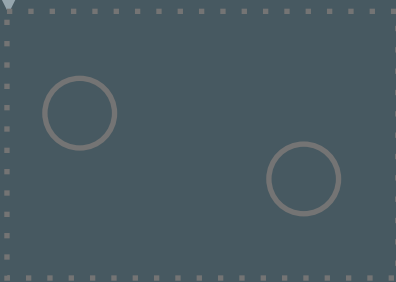95 EVREUX. — La Place du Grand-Carrefour. — LL.

© Marty Hogan

© 4ever.eu

● A place creates a crossroad

● Paths crossing creates a place

● Paths intersect do not cross - no meaningful place exists here

Concept

Name

TRAIL

Thing
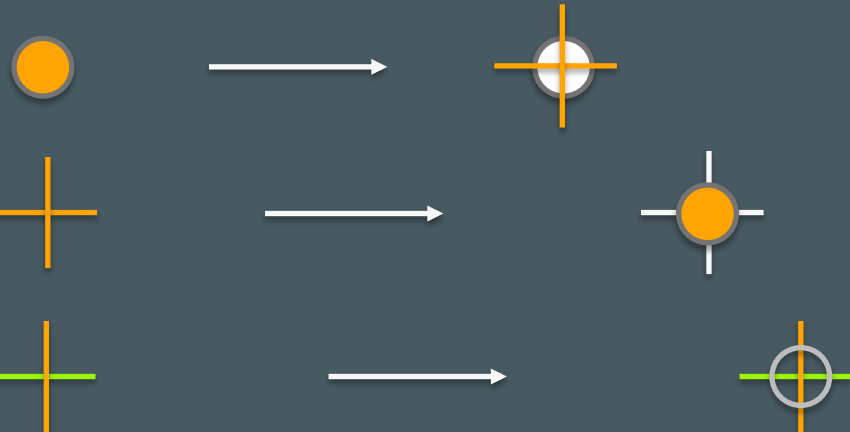
How do we conceive movement over space ? From path to pathway system

Network
Places are connected by path(s),
or paths connect existing places

Concept

Meshwork
Places are produced by knots of pathways
Pathways entangle, creating places

Ingold 2011
Lefebvre 1974

Links

Nodes

Existing space
Defined places

versus

Produced space
Emergence of places

Pathway
(cheminement)

Knots

Both conceptions are present in the landscape

Transport network

&

Task meshwork

Murray-Rust, D, Tarte, S, Hartswood, M & Green, O 2015, On Wayfaring in Social Machines. in WWW '15 Companion Proceedings of the 24th International Conference on World Wide Web. ACM, pp. 1143-1148. DOI: 10.1145/2740908.2743971
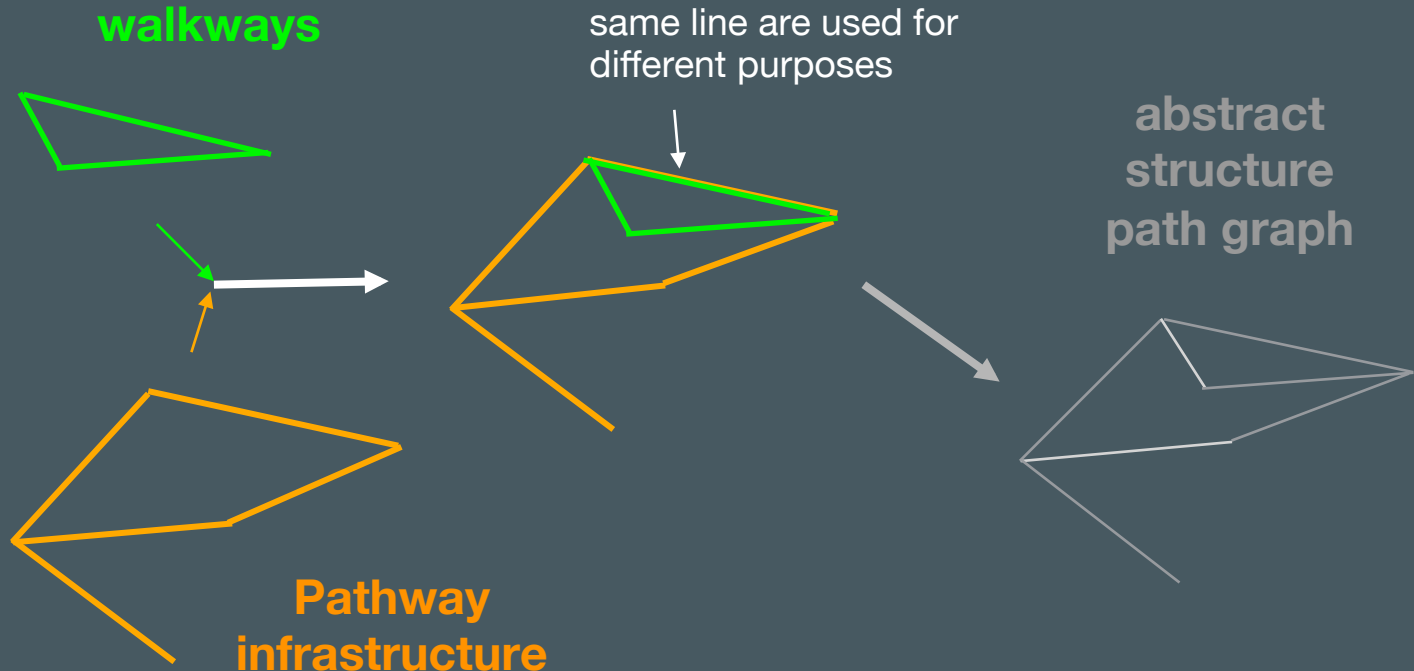
wild boar's walkways

same line are used for different purposes

abstract structure path graph

Pathway infrastructure

Emerging concept: « path graph »

arrangement meaning

abstract structure

« Path Graph »
**cumulative - non-hierarchical**

Pathways system

Path graph =
set of all realized and potentially realized movements within an area. Built by cumulative elements, segments and nodes (not always active as a node)

Path framework system
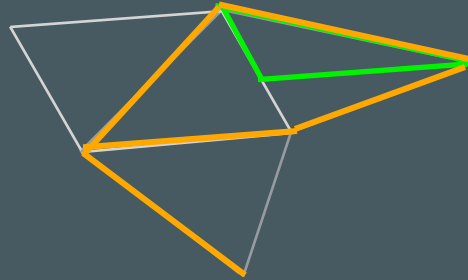
Pathway system = designed by usage, behaviour of individuals or groups according to various goal. The pathway system designs a "network" or "meshwork" which can be shared but without a formal framework. It remains mostly implicit and can be multiform
==> agency

« Path framework » system = designed by a society, recognized as such by a group.
Formalized and shared as such by the group. It could be materialized by a road, a simple trail or by a series of landscape markers (architecture, remarkable elements…) or by a narrative (without materialized traces)
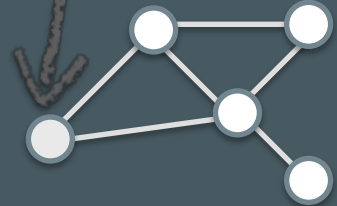⇒ society
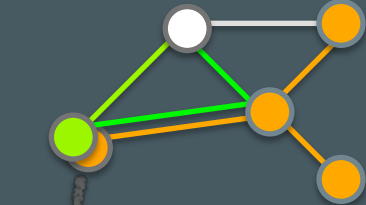
How can the path graph concept help ?

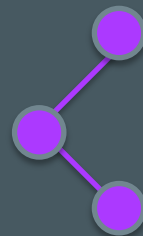Crossroad dilemma → Active or Inactive Nodes when used in pathway system or path framework system

Active node

Active node — *Active node*

Inactive node
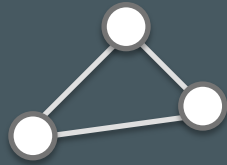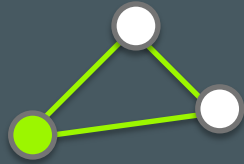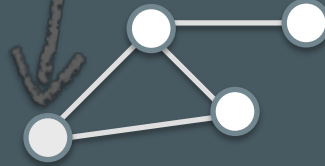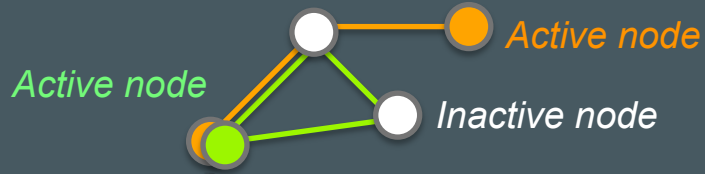
t1   t2   t3

Method: GIS records & simulation -> network reconstruction for analysis

GIS records & simulation

detected

thing

modelled (predictive model → general assumptions on movement)
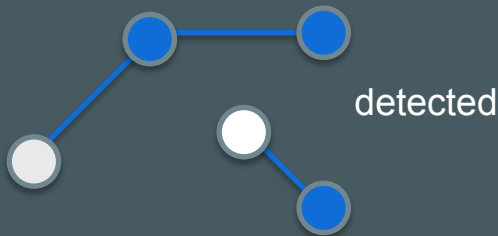
Abstraction => graph

"Path graph"

cumulative abstract
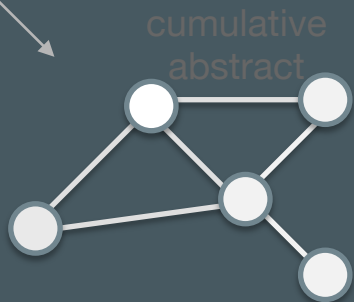
- Vector
- spatial reference
- scale - generalization
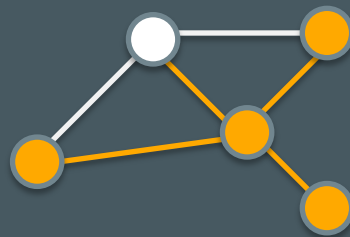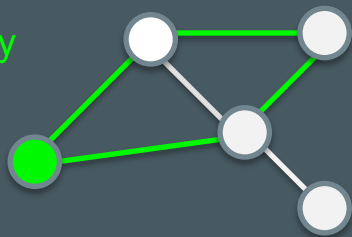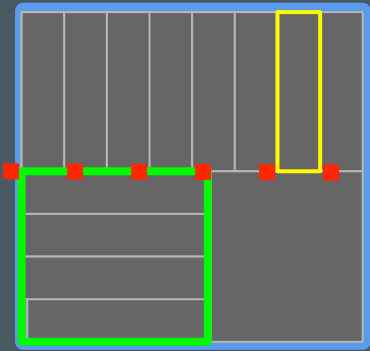
Network reconstruction for analysis

pathway system

Concept

path framework system "roads & trails" network

Illustration - case study of headlands

Headlands
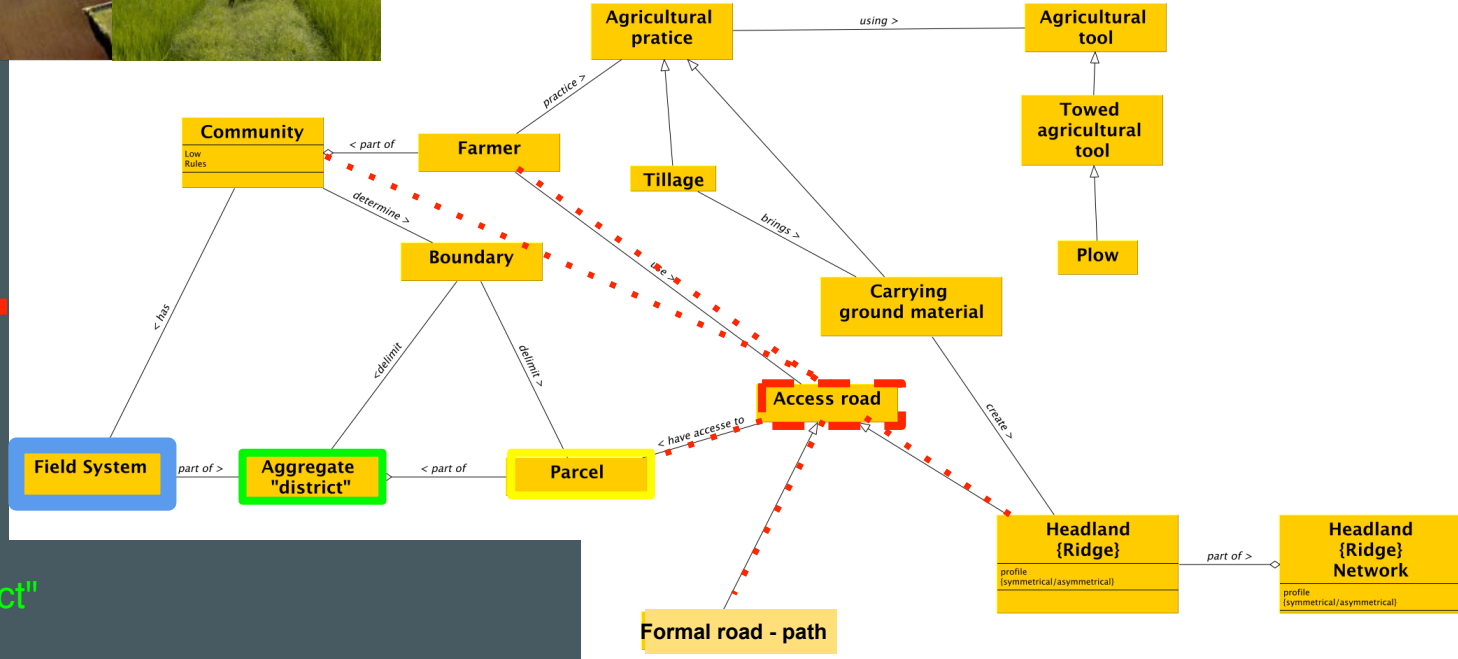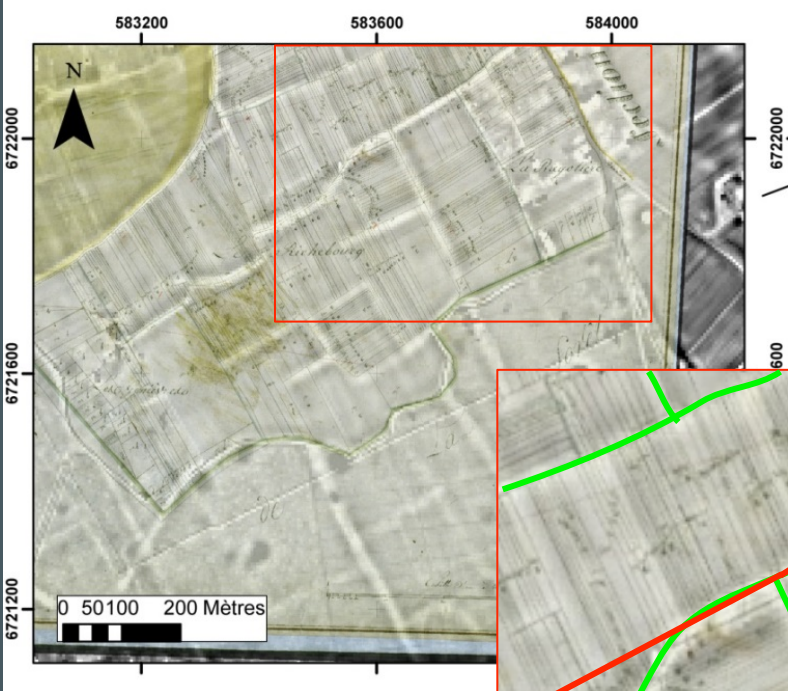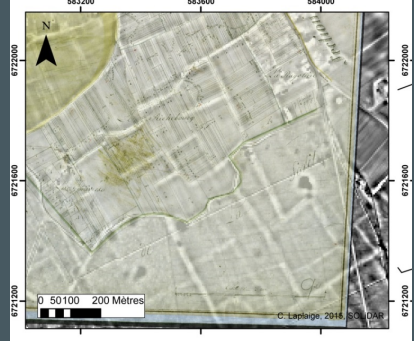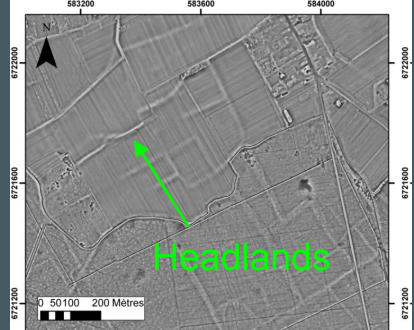
C.. Laplaige - Solidar / CITERES - Univ. F. Rabelais TOURS
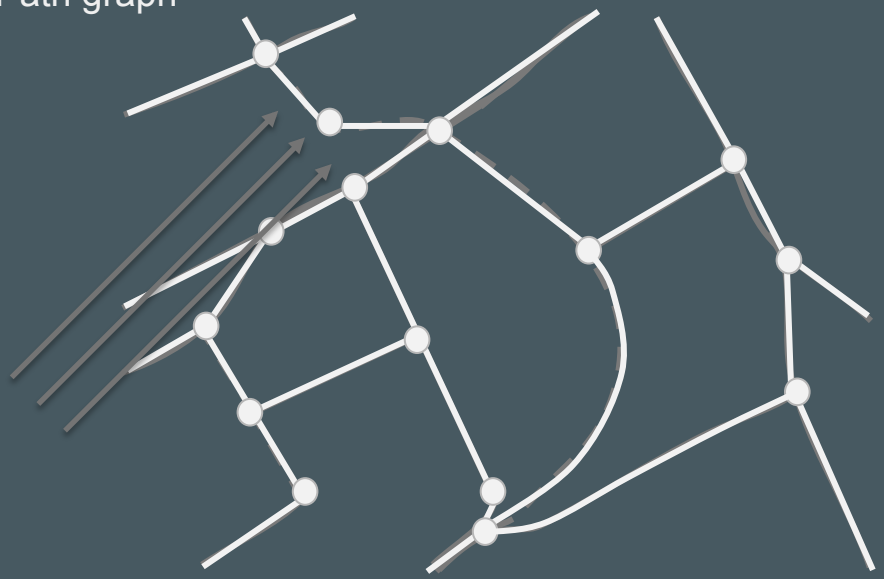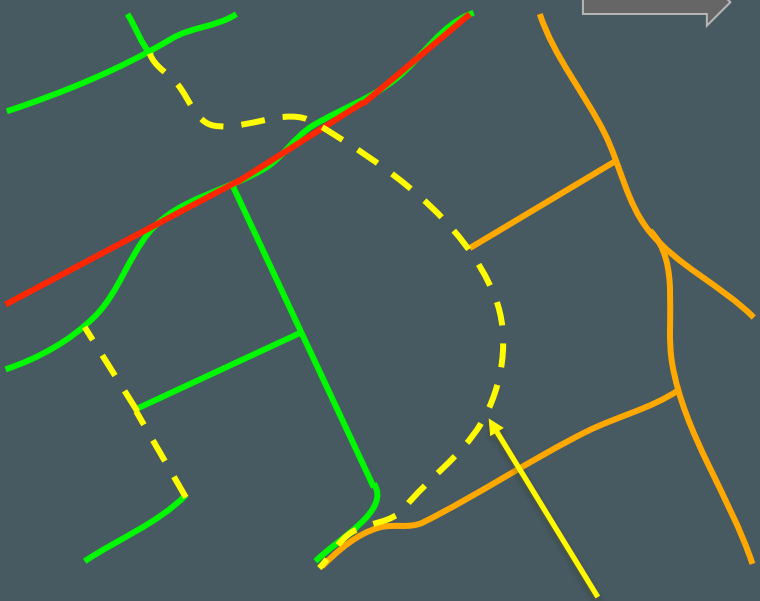
SOLiDAR

Initial records (detection) and
simulation of movements
(predictive models based on general
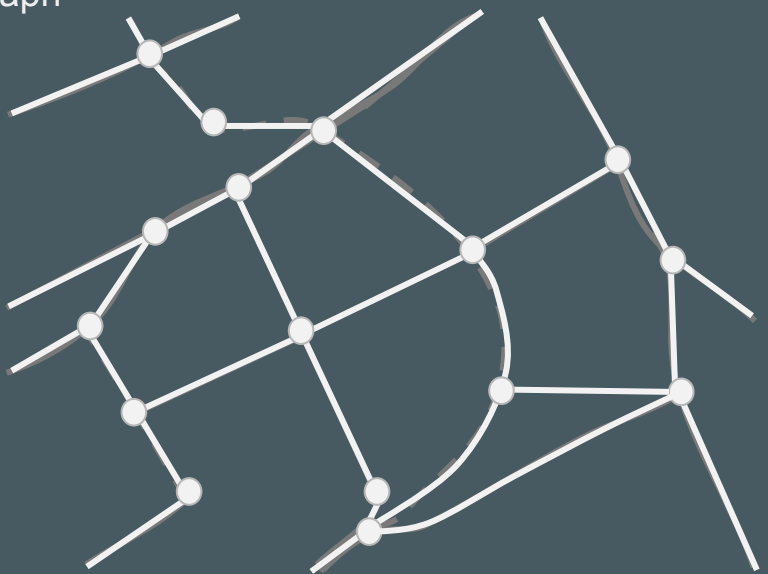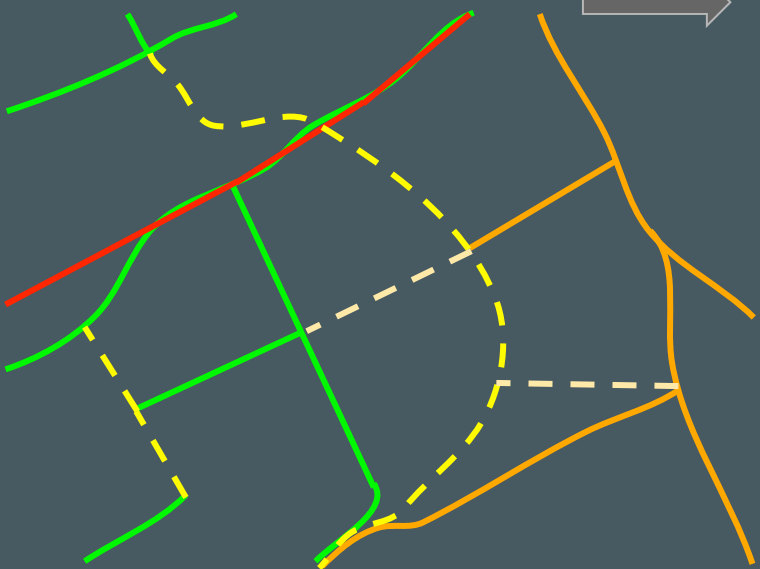assumptions of movements)

"Path graph"

predictive models

Initial records (detection) and
simulation of movement
(predictive models based on general
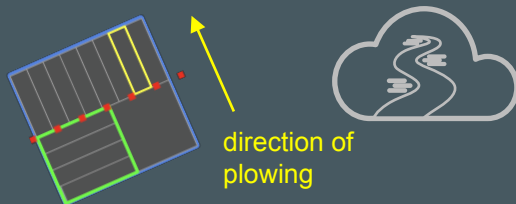assumptions on movement)

⇒ CUMULATIVE EFFECT

"Path graph"

Initial records (detection) and simulation of movements (predictive models based on general assumptions on movement)
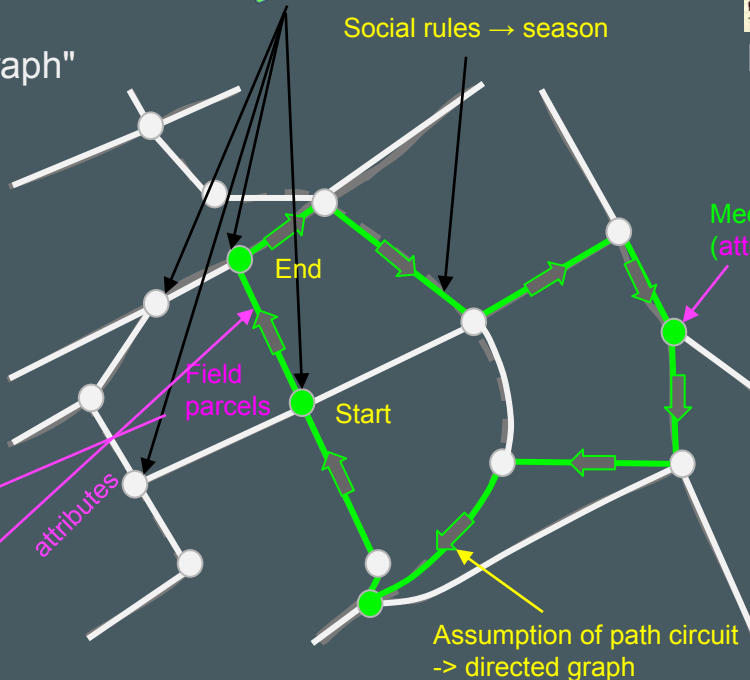
"Path graph"

direction of plowing

Social rules → season

Medieval farmer

Medieval village (attributes)

End

Field parcels

Start

attributes

Sites database

External knowledge

Assumption of path circuit -> directed graph
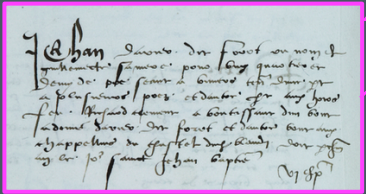
Rossi Albane, 2018. Les hommes et le finage à Blandy-les-Tours en 1508. La question du territoire agraire en pays d'openfield. PhD Thesis, Univ. de Bourgogne-Franche-Comté.

Pathway system
⇒ model of reconstruction based on ontology and external spatial knowledge

Conclusion & perspectives

- **formal approach based on graph theory and ontology can help to**
  - **bring together cases from different backgrounds**
  - **explore multiple meanings**
  - **make explicit the set of assumptions used to reconstruct the network**
  - **experiment with emergence and durability**
  - **analyse at different scale levels**
  - **compare pathway systems**

- but
  - emerging concepts need to be tested in case studies
  - need experiments with different conceptions and different scale levels
  - tools for building and analysing path graphs needed
  - and … we need a better name for the path graph