BUILDING ZONE AND PUBLIC TRANSPORT: WHAT PLANNING INTEGRATION AT CORRIDOR LEVEL?

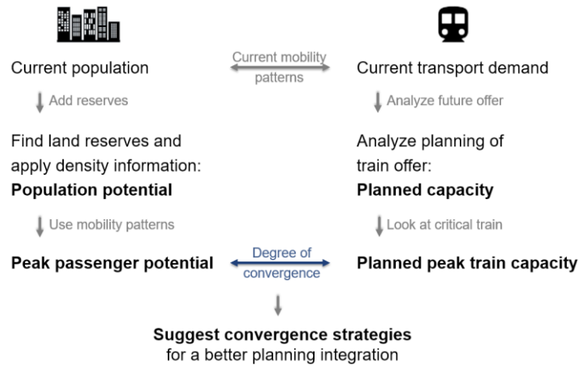
Introduction of a method to estimate planning integration: degree of convergence
Development of strategies for a better planning integration: convergence strategies
Case study: Fribourg, Switzerland

Introduction

An integrative planning is a precondition for a sustainable and economical spatial development. However, such a planning is never an easy task. This thesis focuses on two planning fields of importance, namely the building zones and the public transportation, and puts them in relation.

In order to understand and to analyze this relation, this study is composed of two essential parts. First, a method and a model are developed to put in relation building zones and public transport offers. This relation is quantitively estimated to express the level of integration of building zone and public transport planning. The expression *degree of convergence* is used in the present study to define this relation. In a second step, some planning integration strategies, or *convergence strategies,* are suggested and tested with the method's model. The goal is to give an idea of different possible approaches that can lead to a better planning integration.

Study approach



The analysis is directly done for the critical moment in the system, which is in the corridor under investigation the train in the morning peak hour (peak train).

First, the passenger potential on the peak train (peak passenger potential) has to be estimated from the population potential, which is itself estimated from the building zone reserves. Secondly, the planned peak train capacity has to be found out. These two first steps make the calculation of the degree of convergence possible. Finally, convergence strategies are suggested in order to balance the building zone and transport offer developments.

Model

The model developed for this study puts in relation building zone reserves and passenger demands. It takes into account various factors such as existing municipality statistics, reserves' availability, local building zone regulations, mobility demands and reserves' distance to train stations. The logic of the model is presented below in a simplified way; it shows the most important work steps of the model.

WORK STEPS	MAIN INSTRUMENTS
Building zones (land area) Discover built-up area & reserves	Map analysis Land registration Mobilization rates
Population (people) Consider current population & estimate number of people that could take place in reserves Two components: Inhabitants & full-time jobs	Regulation interpretation Density indexes Proportions of inhabitants and jobs Floor area consumptions per user
Passenger demand at stations (people) Estimate future passenger demand at each station for peak train (critical train)	Mobility patterns
Passengers at corridor level (people) Aggregate future passenger demands of all corridor's stations for peak train (critical train)	Addition

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Yannick Riedo | 1

IRL – Institute for Spatial and Landscape Development
Chair of Spatial Development

BUILDING ZONE AND PUBLIC TRANSPORT: WHAT PLANNING INTEGRATION AT CORRIDOR LEVEL?

Introduction of a method to estimate planning integration: degree of convergence
Development of strategies for a better planning integration: convergence strategies
Case study: Fribourg, Switzerland

Model projections

The model makes projections in different fields:

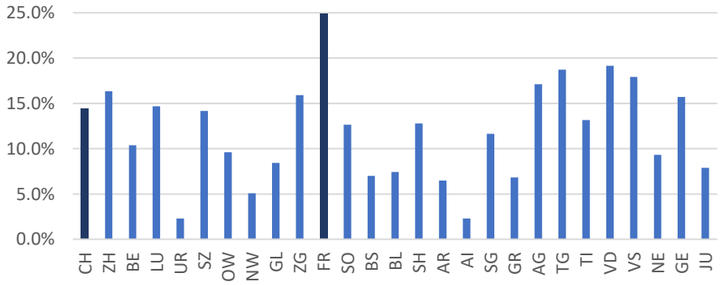
- Land reserves in building zones
- Population (inhabitants and full-time jobs)
- Passengers (for the critical train in the peak hour)

Low and high projections correspond to the lowest and highest simulated scenarios.

Regional context

A corridor in the region of Fribourg, Switzerland, is chosen as a case study because it is the fastest growing area in Switzerland. In this particular regional context, a good planning integration is crucial.

Population increase in Switzerland and all Swiss cantons, 2015-2030 forecasts (Reference scenario):
CH = All Switzerland / FR = Fribourg



Source: Federal Statistical Office, 2016

Results

Municipality level

The results for every municipality are given in the form of indicators and maps. Indicators provide statistical information about the municipality in different fields. All data are processed for this study. Maps show the building zones and the building land reserves in each municipality. All maps are made for the present study. An example is reproduced on pages 3 and 4.

Corridor level

Then, it is possible to aggregate the passenger projections on the corridor level and to compare the result with the planned peak train capacity. In this way, corridors can be analyzed with the model to estimate the level of planning integration (degree of convergence) between building zones and public transport offers.

In the analyzed corridor, the planned train capacity is higher than the estimated maximal number of passengers based on the building zone reserves.

Convergence strategies

The model shows that it is possible to further develop the building zones and to accommodate more people along the train line without encountering train capacity issues.

In order to show what it could look like on the ground, different possible approaches, called in this study convergence strategies, are developed and tested with the model:

- Densification through density index changes
- Parcel transfers towards more populous building zone types
- Building zone extensions
- Mixed approach

YouTube

A video presents some key elements and results. It can be accessed by using the link or by scanning the QR code:

www.youtube.com/watch?v=rsDilcB_XJc

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

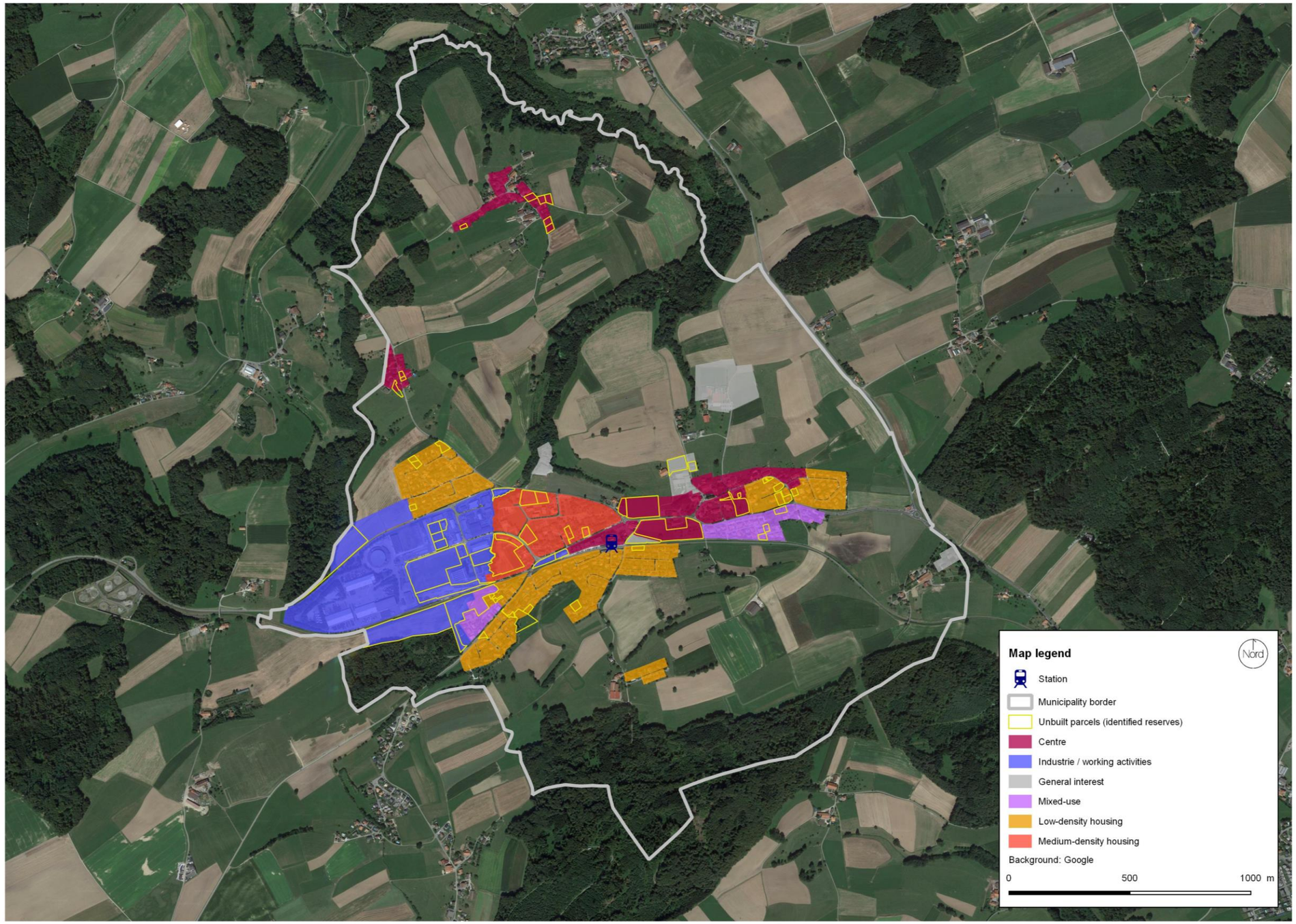
Yannick Riedo | 2

IRL – Institute for Spatial and Landscape Development
Chair of Spatial Development

Map (example)

The model is mainly based on building zone reserves. The first step of the analysis consists in finding the land reserves in the building zones. This map shows the building zones and the identified reserves in one of the analyzed municipalities.

Then, the model can calculate projections based on the building zone reserves.



BUILDING ZONE AND PUBLIC TRANSPORT:
WHAT PLANNING INTEGRATION AT CORRIDOR LEVEL?

Introduction of a method to estimate planning integration: degree of convergence
Development of strategies for a better planning integration: convergence strategies
Case study: Fribourg, Switzerland

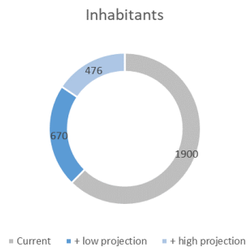
Projections (example)

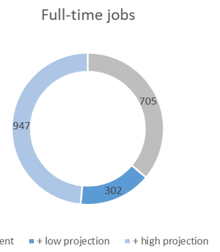
The model makes projections for every analyzed municipality. The results of one of the municipalities is reproduced on this page. Then, all results can be aggregated on the corridor level. In this way, it is possible to calculate the maximal number of passengers on the peak train and to compare this number with the planned capacity.

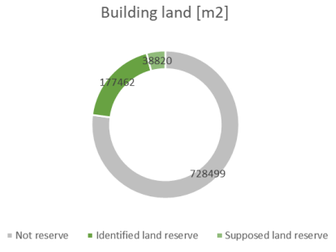
The model is also used to evaluate possible convergence strategies and building zone changes. The goal is to find solutions to better use the provided train capacity.

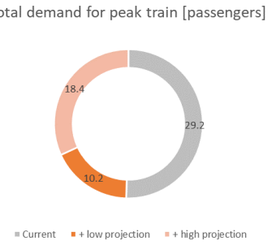
Municipality of GROLLEY

OVERVIEW

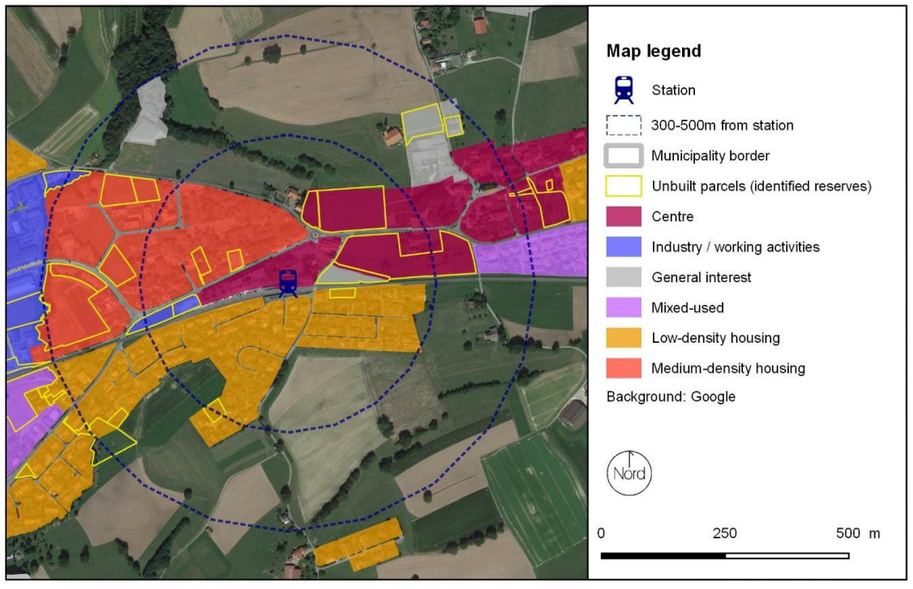




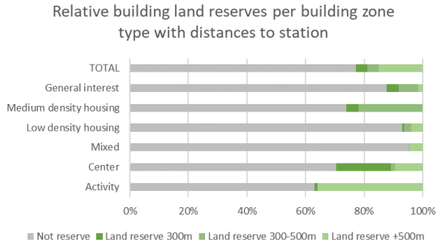


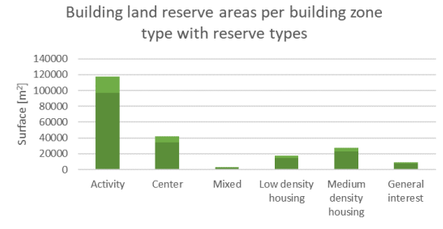


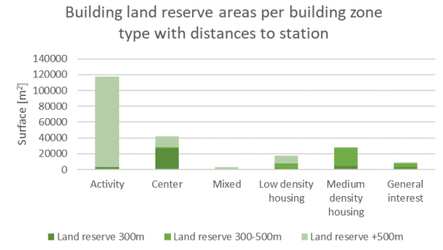
STATION PROXIMITY



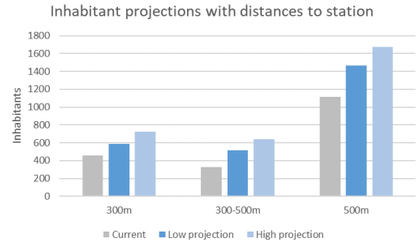
DETAILED LAND PROJECTIONS

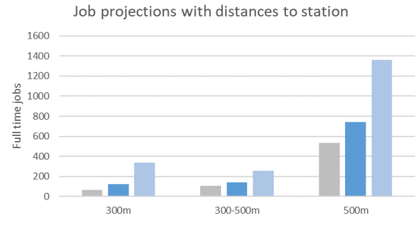




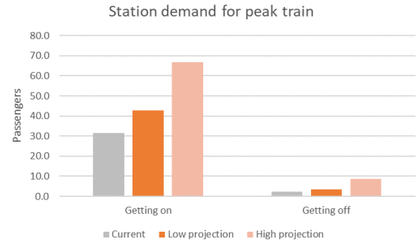


DETAILED POPULATION PROJECTIONS





DETAILED PASSENGER PROJECTIONS



COMMENT

The station is used by the municipalities of Grolley, Ponthaux and Noréaz. The passenger demands are presented independently for each municipality: The demand presented in this sheet is for the municipality of Grolley only and is not the total demand at the station.

DENSITY INFORMATION

Zone type	Density Index Min	Density Index Max	Housing Share	Activity Share
Activity	0.8	0.8	0.25	0.75
Center	0.5	0.8	0.5	0.5
Mixed	0.53	0.53	0.5	0.5
Low density housing	0.5	0.6	1	0
Med. density housing	0.6	0.74	0.75	0.25
General interest	0.67	0.67	0.25	0.75

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Yannick Riedo | 4

IRL – Institute for Spatial and Landscape Development
Chair of Spatial Development