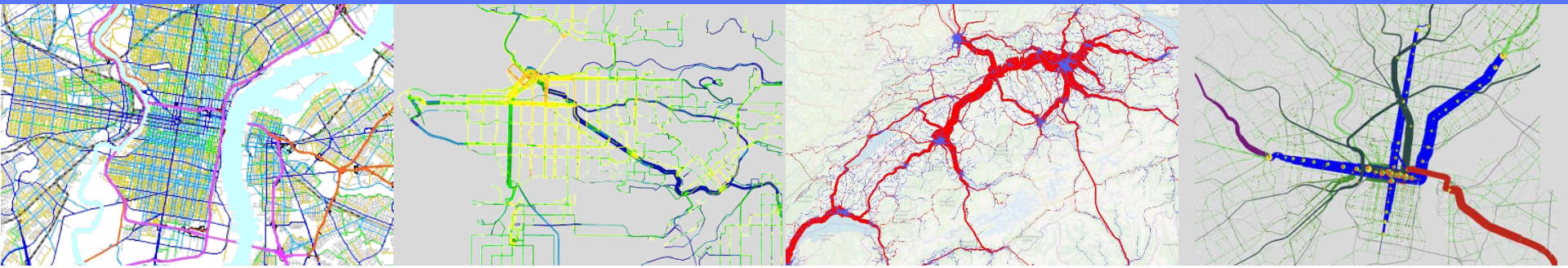

Planning of Effective Rail Service - International Cases

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“Planning of effective rail service”
What am I talking about?

- Effective ≠ efficient
- Rail planning needs a long-term perspective
- My focus:
  - Passenger demand forecasting
  - Travel demand models
- Five cases of rail planning and ridership forecasting

Effective rail service – it's all about travel time

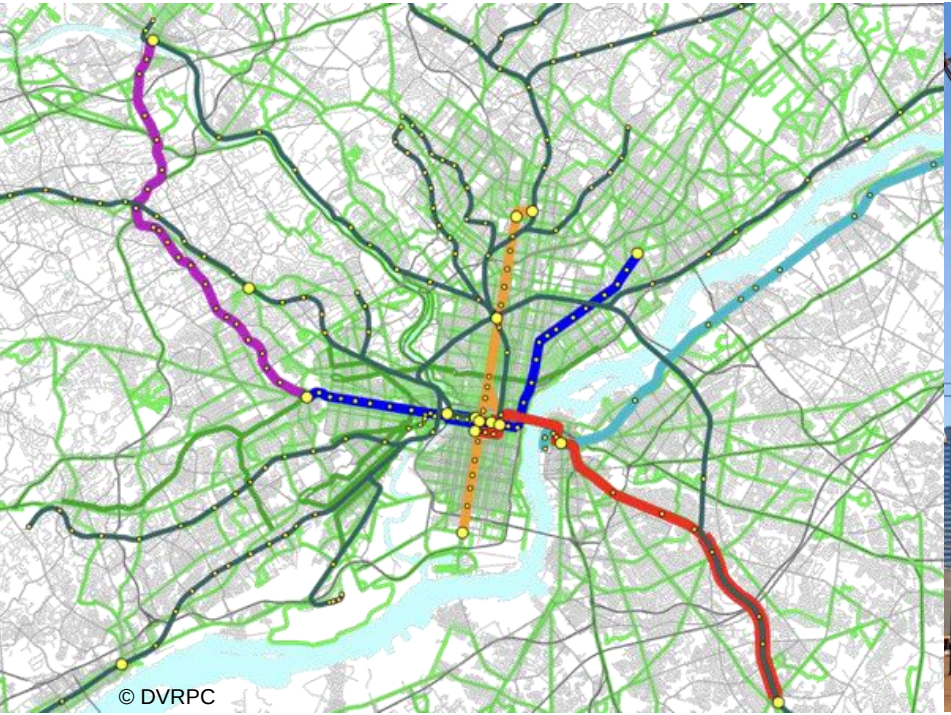
- Passenger rail service is effective if it attracts passenger demand
  - Attractive service will meet other goals as side effect (less climate footprint, less road congestion, more accessibility…)
- Travel time is the main leverage to attract passengers
- Secondary factors:
  - directness, service frequency, reliability,
  - soft service attributes (dining car etc.),
  - price
- Travel demand models can help to develop effective rail service

Rail planning – interaction of several expert areas

In practice:

- Many meetings
- Listening and explaining
- Projects of long duration
- Travel forecasters should participate in each phase of a project

Philadelphia, USA (DVRPC)
Railway since the 1800s – travel model since the 1960s



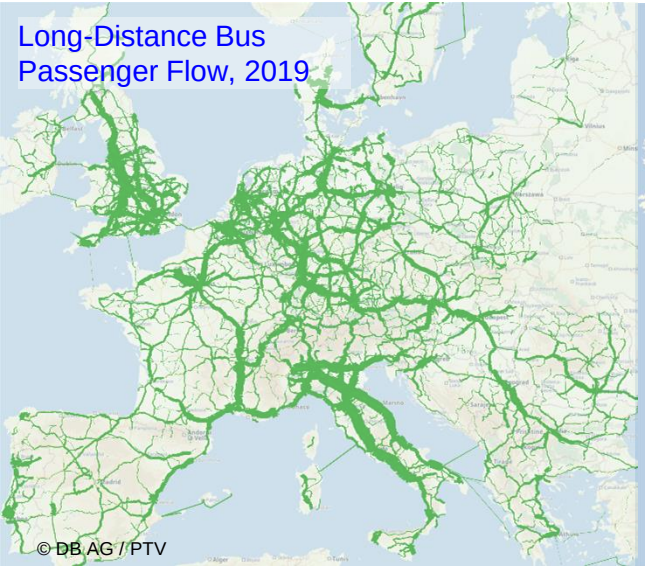
To unfold their full potential, travel demand models need to be institutionalized

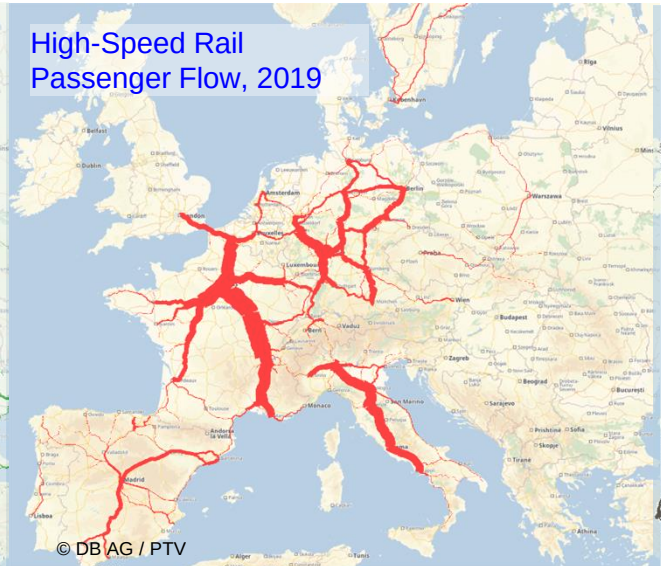
To keep a model alive over time, it needs:

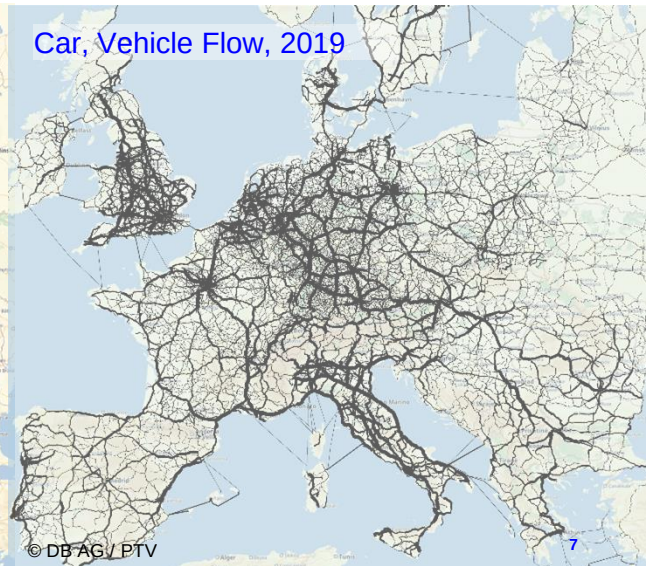
- Integration of forecasting in business (or government) processes
- Continuous maintenance of data and parameters
- Learning over time from prediction success (or prediction error)
- Building-up and retaining know-how (and staff)
- Keeping the balance of conservation and innovation

Metropolitan Network – Europe-wide forecasting of high-speed rail demand 2050

- See presentation yesterday (Marco Kampp, DB)
- Modeling long-distance travel demand at the European scale



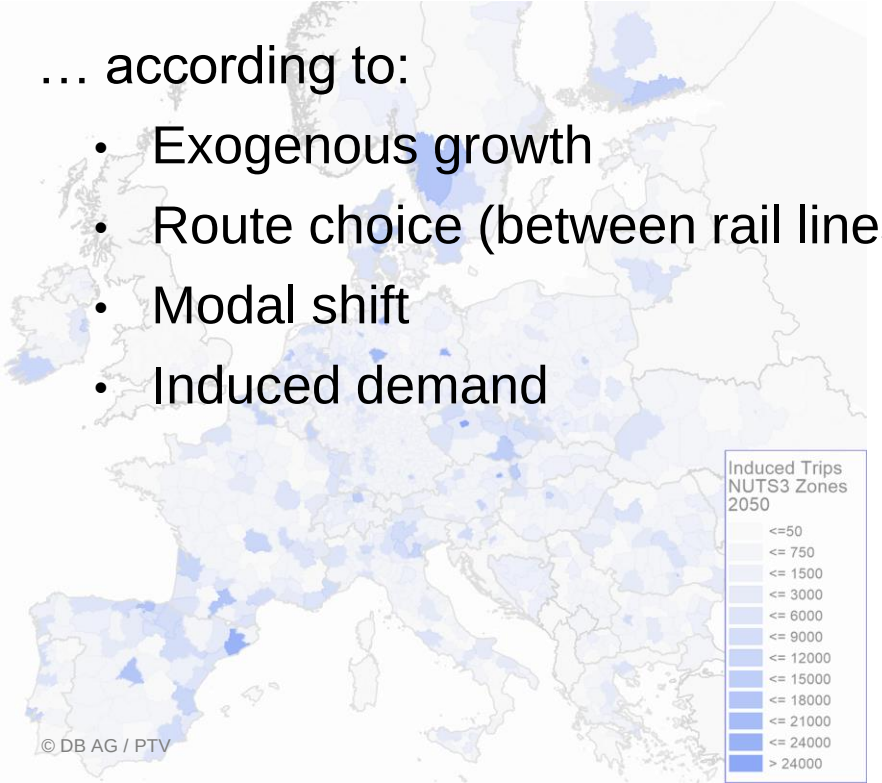


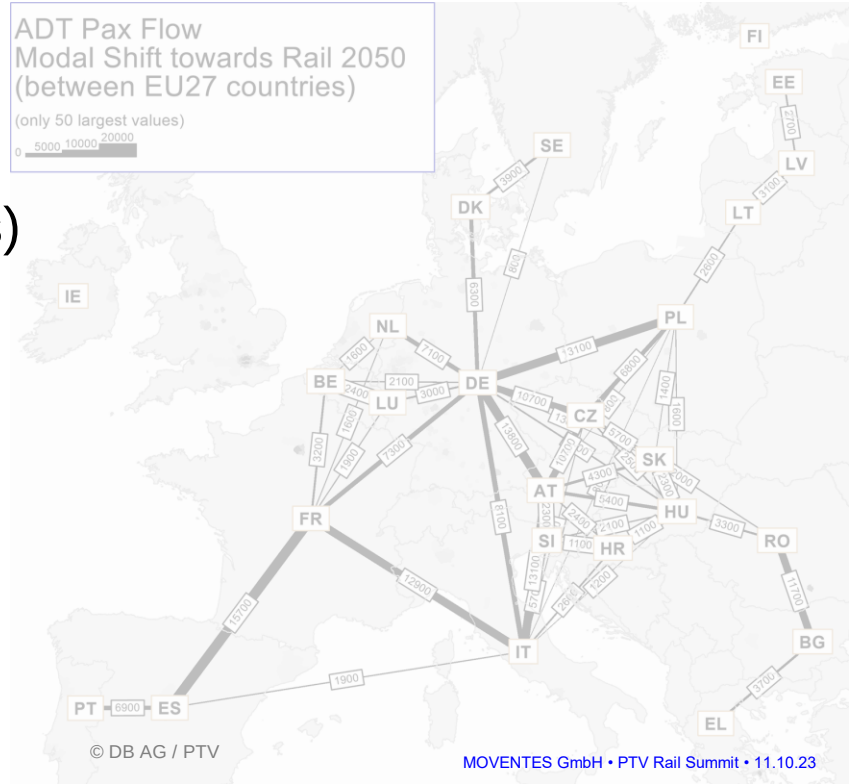


Long-term rail demand forecasting: Gains in passenger demand need to be broken down

… according to:

- Exogenous growth
- Route choice (between rail lines)
- Modal shift
- Induced demand





Geneva, Switzerland/France
Léman Express – border-crossing regional rail service

- In operation since 2020
- Mid-term planning between 2012 and 2017

SBB train

© pinterest

SNCF train

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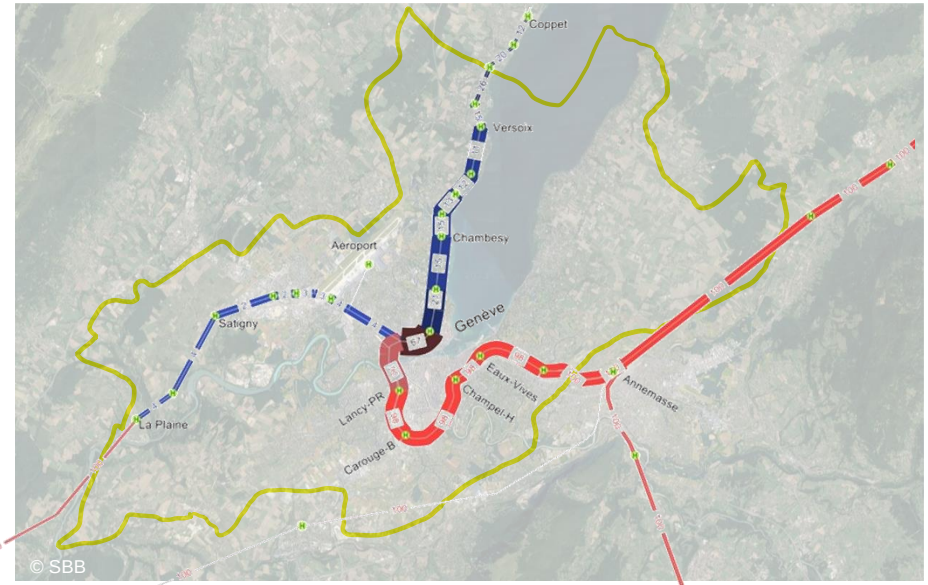
Mid-term planning of Léman Express
Fleet assignment, service frequency, line route refinement

- Hybrid demand forecast, combining 4-stage and data-driven models



- 24-hour dynamic pax assignment

link : from station >> to station	train departure time at first station															
	06:04	06:19	06:34	06:49	07:04	07:19	07:34	07:49	08:04	08:19	08:34	08:49	09:04	09:19	09:34	09:49
CO >> TA	0	1	3	6	17	26	40	38	64	37	51	13	14	6	7	3
TA >> MI	1	2	6	9	21	33	46	45	68	40	53	15	15	8	8	4
MI >> PT	2	3	9	12	27	38	52	51	76	46	56	19	19	10	9	5
PT >> VS	20	30	56	73	118	127	141	133	144	110	105	64	55	38	33	22
VS >> CR	30	47	91	123	197	215	234	226	218	192	144	110	87	62	50	39
CR >> GD	31	50	95	127	204	224	242	233	227	201	152	115	91	64	51	40
GD >> TU	34	59	107	144	229	264	274	252	252	217	160	125	104	70	55	44
TU >> CH	36	61	113	149	239	273	293	260	263	223	164	127	105	71	56	45
CH >> SE	37	64	117	154	245	283	311	268	272	230	167	131	108	74	59	50
SE >> GE	37	62	111	144	219	245	255	248	236	214	145	123	91	70	54	49
GE >> LA			158	232	303	296	308	288	245	156						
LA >> BA			132	203	253	260	257	255	205	137						
BA >> CH			137	215	259	277	267	269	210	146						
CH >> EV			96	165	181	204	187	212	146	107						
EV >> CH			65	101	123	132	128	140	100	70						
CH >> AN			26	40	51	52	51	71	41	27						

Legend:
- < 25% seat capacity used
- 50% seat capacity in use
- 100% seat capacity in use
- 100% seat and 50% standy capacity in use
- Total capacity (seat & standy) in use

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Vancouver, Canada
Several studies of service planning and fleet strategy

- Skytrain – automated trains
- … operating on a 108-second headway in 2006

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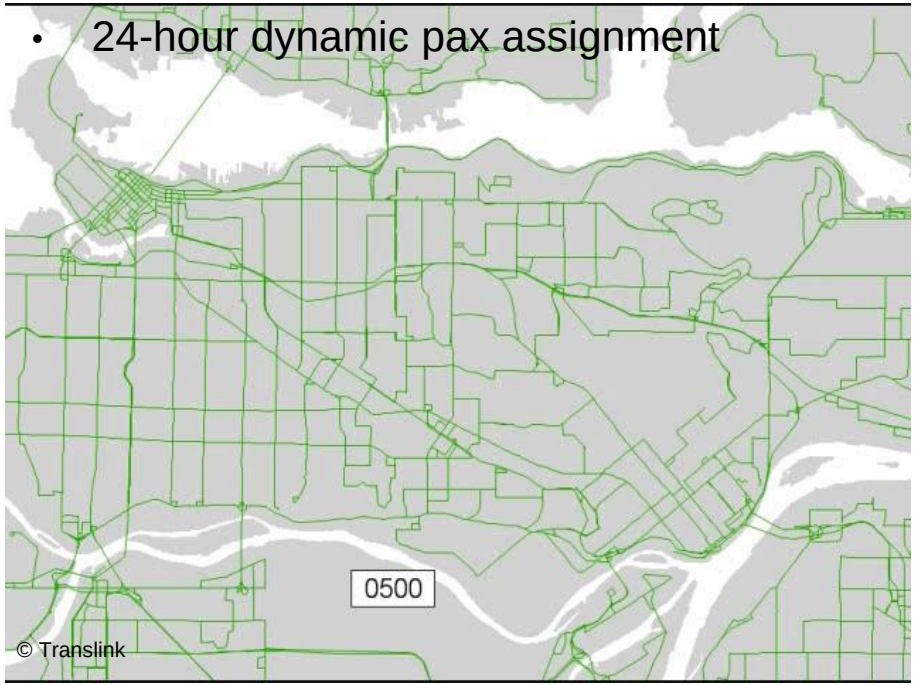
- 24-hour dynamic pax assignment



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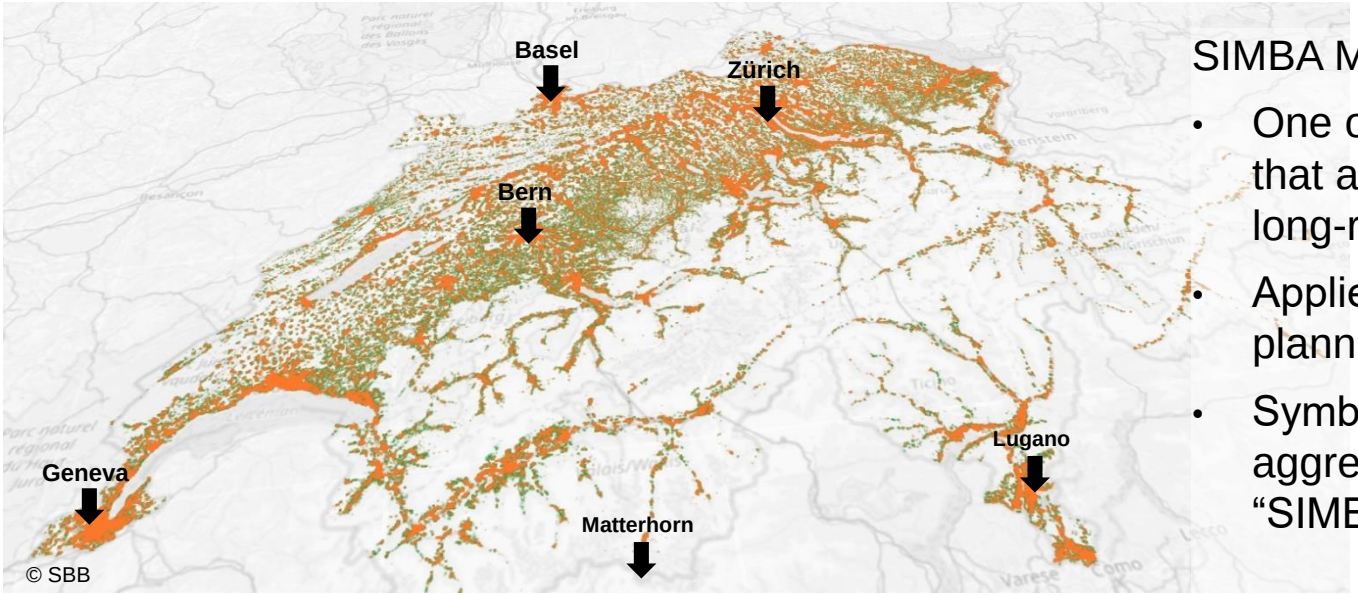
SBB, Switzerland
ABM: agent-based demand model (SIMBA MOBi)

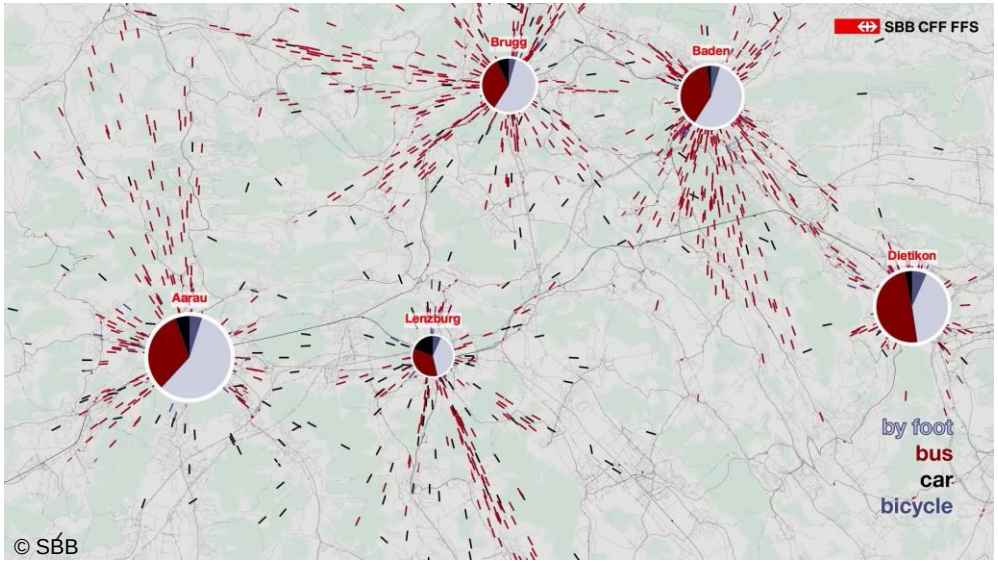


SIMBA MOBi:

- One of five ABM in Europe that are used in mid- and long-range planning
- Applied by SBB's service planning since 2019
- Symbiosis with SBB's aggregated & dynamic model "SIMBA Bahn"

SBB – SIMBA MOBi
ABM: an innovation bringing benefits to rail planning

Example of application:
Simulating rail access by mode



Benefits for SBB:

- More realism of mobility and travel
- High resolution of demand
  - by type of traveler
  - by time and space
- 24-hour dynamic simulation
- Planning rail access
- Forecasting demand at new stations
- Planning future mobility services
- Induced demand vs. mode choice

Summary

- Travel demand models can contribute to develop effective rail service with a focus on improving travel time, directness and headway
- Travel demand models need to be institutionalized
- In the assessment of rail projects, modal shift and induced demand should be separated
- Dynamic passenger assignment has potential in mid-term planning
- Prediction success testing should become a standard procedure
- Agent-based models are a worthwhile investment

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