Real-World Scenarios in **FLAT**LAND

This part is about finding real-world problems and infrastructures that should be depictable in Flatland. The goal is not to implement whole real-world scenarios, but rather to identify the building blocks of our real world Flatland potentially could implement.

The building blocks are only named, described and explained -- they are not evaluated or judged, or garuanteed to be implemented in Flatland for that matter.

The building blocks are categorised and drawn in simplified manner. This should help to keep the list as tidy as possible.

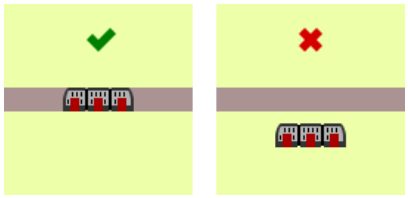
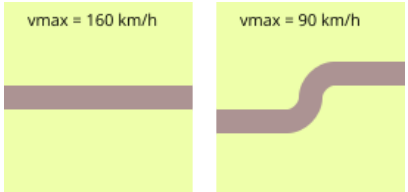
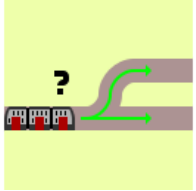
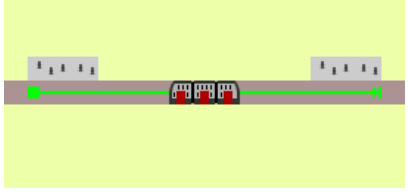
TL;DR: Look at list, think about whether Flatland needs the item, keep answer for yourself.

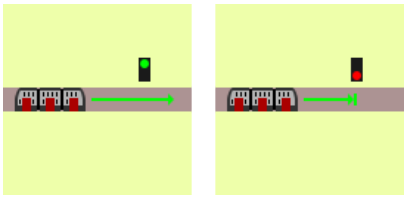
Finding and disassembling real world scenarios

Scenarios or their part problems could be thought of. However, railway and similar systems exist for quite a long time already[citation needed] and thus another valid approach is to look at real railway infrastructures, services and operation modes to extract the building blocks that make up e.g. a whole railway system.

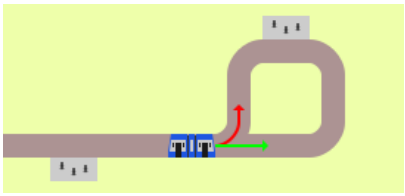
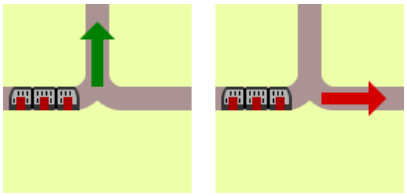
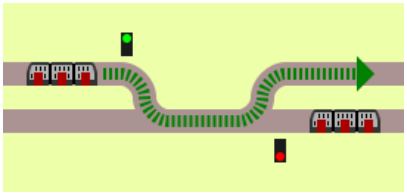
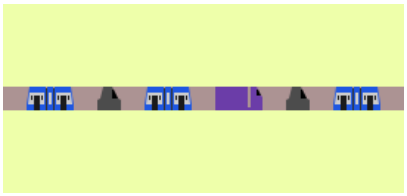
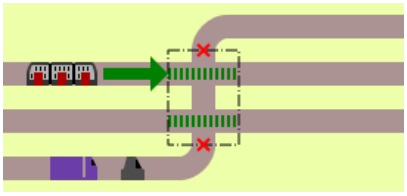
The more building blocks there are found and implemented (or made possible to be implemented) in Flatland, the more use cases Flatland can handle.

Microscopic infrastructure and principles

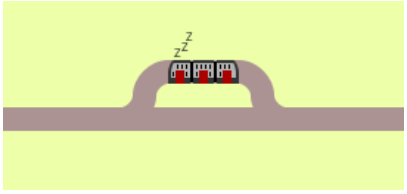
Preview	Element	Explanation / Example	Domain
	Track	Where agents can move (or be).	railway
	Track specifics	Track with specific length, vmax, gradient...	railway
	Switch	Where agents can take directional decisions.	railway
	Station	Where agents can start / stop their jurney.	railway

Preview	Element	Explanation / Example	Domain
	Signal	Lets agents pass or halt.	railway
TODO	Distant signal	Gives agents information about upcoming signal.	railway
TODO	Cab signal	Gives agents real-time information about signals on line.	railway
TODO	Axle counter	Senses passing of agent (directional). Allows localization of agent.	railway
TODO	Balise (fixed)	Gives agent information about its location.	railway
TODO	Balise (transparent)	Gives agent information about upcoming signals and more.	railway
TODO	Radio	Allows agents to communicate with system (two way).	railway
TODO	Block	Section of track occupied by an agent.	railway
TODO	Block overlaps	Blocks that physically overlap on line.	railway
TODO	Interlocking	Signals can depent on other signals, i.e. interlocked signals can only be operated as a group.	railway
TODO	Reservation	Section of track reserved by an agent.	railway
TODO	Speed profile	Agents have specific acceleration, max. speed, deceleration.	railway
TODO	Length	Agents have specific length.	railway
TODO	Size	Agents have specific space requirements.	railway
TODO	Power type	Agents have specific types of fuel they rely on.	railway
TODO	Power consumption	Agents have specific power intakes.	railway
TODO	Power supply	Resources offer specific power supply.	railway
TODO	Structure gauge	Tracks have specific space capacities.	railway
TODO	Capacity	Agents have specific capacities for objects.	railway

Infrastructure

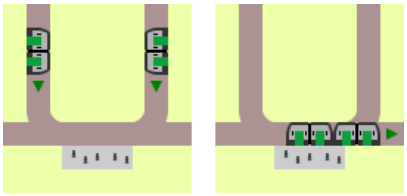
Preview	Problem	Explanation / Example	Domain
	Resources can be one-way	If a tram drives/stops on the track the wrong way, there won't be a platform for people to get out, thus in a station it's only allowed to drive on the "right" track.	tramway
	Resources are directional	The options for an agent on a switch depend on the direction it's approaching.	railway, tramway
	Resources are reservable	A train may only enter a resource if the exit resource is also available. It has to reserve them both i.o.t. prevent dead-locks.	railway, tramway
	Resources can be shared by different agent types	Even tho cars and trams do not drive on the same ground, they share the same space and therefore share one resource.	mix
	Resources can be reserved for one agent type	Level crossings can be exclusively reserved for either a train or a car.	mix

Agent

Preview	Problem	Explanation / Example	Domain
	Agents can be without objective	If a train reached its final destination, it does not have an objective any longer. However, it is still using a resource.	railway
TODO	Agents can be one-way	Some trams cannot reverse.	tramway

Service (combining Infrastructure and agent)

Preview	Problem	Explanation / Example	Domain

Preview	Problem	Explanation / Example	Domain
TODO	Speed profile depends on both resource vs. agent sub-type	Some switches have to be passed slow by certain train types.	railway
TODO	Passage possible for certain agent sub-types only	Tunnels that are too low for "DOSTO" trains; electrified loks can only drive on electrified tracks; ETCS-1 trains can't drive on ETCS-2 tracks.	railway
TODO	Exit possible for certain agent sub-types only	Platforms that are too short for "IC" trains.	railway
TODO	Turn around possible for certain agent sub-types only	Trams with doors on both sides can turn around at stations with "Spurwechsel".	tramway
	Connecting agents at stations	Some train types allow to be connected into one at certain stations (multiple starting points, common end point).	railway
TODO	Disconnecting agents at stations	Some train types allow to split into two at certain stations (common starting point, multiple end points).	railway

Failure modes and effects

Preview	Problem	Explanation / Example	Domain
TODO	Agent arrives a little late	A train arrives a few minutes late at its destination for unmodelable reasons.	railway
TODO	Agent arrives t>>0 late	A train arrives many minutes (e.g. > "Taktfahrplan-halbe") late	DB
TODO	Agent can break down	Train stops completely.	railway
TODO	Agent can partially break down	Train max. speed reduced.	railway
TODO	Infrastructure can break down	Trains cannot pass.	railway

Preview	Problem	Explanation / Example	Domain
TODO	Infrastructure can partially break down	Trains can pass at limited speed only.	railway
TODO	Agent needs redirecting	E.g. in a medical emergency a train has to stop at the nearest possible stop, even if unplanned.	railway

Open questions

- Is this list of any help in specifying Flatland scope/feature set?
- Who maintains the list?
- Would a "real-world-pendent" column be helpful?
- Would a "% of occurence" column be helpful?
- Would a more matrix like depiction of domains be helpful?

Next steps

- Cry a little about the things you now realized your solution can't do
- Extend list
- Onboard other domains