



The Urban AI Planning for an Age of Tech

Macroplan
12th November 2024

macroplan



Introduction

Emerging technologies such as AI and autonomous vehicles will make polycentric cities more appealing.

AI could be used to create data driven tools to design better streets and cities, and to match them to the people and corporations that want to make them their home.

Autonomous vehicles will make commutes within and between cities easier and more comfortable, reducing the impact of distance.



Key technologies

Core technologies

- Large language models
- Data driven tools
- Autonomous vehicles
- Robotics
 - Drones
 - Autonomous robotics

Spatial categories

- Household/personal
- Corporate
- District level
- Major infrastructure



Large Language Models



According to ChatGPT



How does AI effect urban development?

AI will significantly impact urban development by making cities smarter, more efficient, and sustainable. It can optimize infrastructure, such as energy management in buildings, and improve urban mobility with autonomous vehicles and dynamic traffic management. AI will enhance environmental sustainability by optimizing energy use, waste management, and climate resilience. It can also improve public safety through advanced surveillance and disaster response systems.

Additionally, AI will aid in urban planning by analyzing data to predict trends, optimize land use, and improve service delivery.

However, challenges like ensuring equity, managing data privacy, and addressing potential job displacement will need to be addressed. If implemented thoughtfully, AI could create more responsive, efficient, and equitable cities while enhancing the quality of life for urban residents.

According to ChatGPT



How does technology effect urban development?

Technology will have a profound effect on urban development, transforming how cities are designed, built, and managed. Advances in areas like AI, the Internet of Things (IoT), big data, and automation will make cities more efficient, sustainable, and livable. Smart infrastructure, such as energy-efficient buildings and predictive maintenance systems, will reduce costs and improve the sustainability of urban spaces. Technologies like autonomous vehicles and real-time traffic management will ease congestion and enhance mobility, while IoT sensors will help monitor air quality, water usage, and waste management in real-time.

In urban planning, technology will enable data-driven decisions, allowing for better allocation of resources, smarter zoning, and optimized land use. Urban environments will become more adaptable to changing needs through smart buildings and infrastructure that responds to real-time data. However, challenges like ensuring equitable access to technology, managing privacy concerns, and addressing potential job displacement due to automation will need careful consideration. Overall, technology will make cities more connected, efficient, and responsive to the needs of their residents.

Large Language Models

Household/Personal

Location
selection

Recommend ideal places to buy or rent a dwelling based on personal preferences and needs

Cultural fit

Potential to monitor social media and other sources to find places that fit with hobbies, occupation, etc.

Market
monitoring

Monitor the market for when suitable dwellings for sale or rent are listed

Large Language Models

Corporate

Supply chains and Logistics

Logistics optimization, vendor and supplier communication, inventory management

Customer support

Acquiring and managing customers and clients, targeted information and support

Employee support

Organising meetings and calendars (especially with WFH employees), recruitment and screening resumes

Large Language Models

District level

Planning

Screen planning applications, optimize land use, monitor and streamlining planning processes

Resident support

Collect feedback from residents, provide information on current and future projects

Policy research

Track and highlight key pieces of policy, suggest applications or potential changes that could be helpful

Large Language Models

Major infrastructure

Public relations

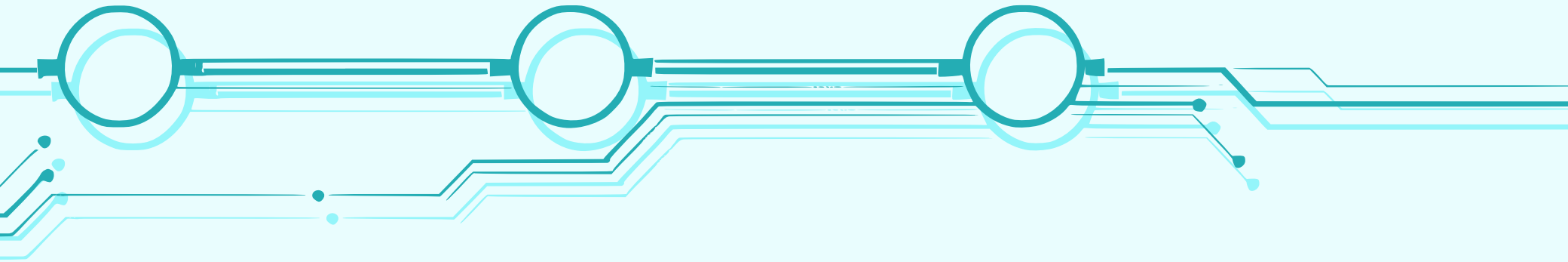
Sharing information on new projects, support for those effects by new infrastructure

Project planning

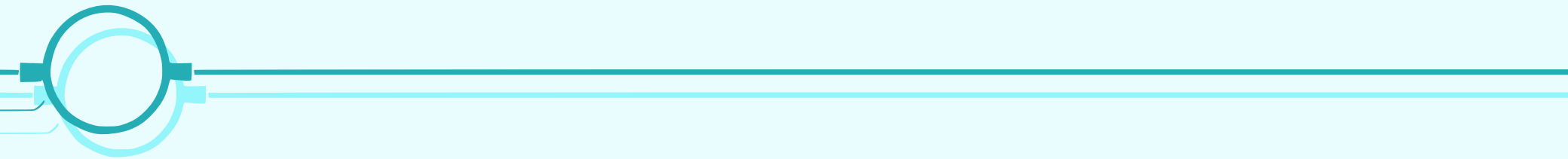
Identifying areas of high need, predicting most efficient processes, navigating regulations and policy

Project support

Streamline communication between builders, suppliers, etc., manage timelines, schedule work and monitor progress.



Data Driven Tools





Data driven tools

Household/Personal

Multiple sources of data could be combined to link people to their ideal homes.

People consider multiple factors (e.g. job, budget, lifestyle, proximity to family and friends, greenspace, schools, accessibility, etc.) when choosing where to live, but real estate sites only help with a handful of these (location, price, type of dwelling).

Tools could be developed to let people enter in multiple preferences to produce personalised suggestions.



If not cities, where?

Household/Personal

People may choose to live somewhere based on the lifestyle rather than what is convenient for their job.

Factors could include:

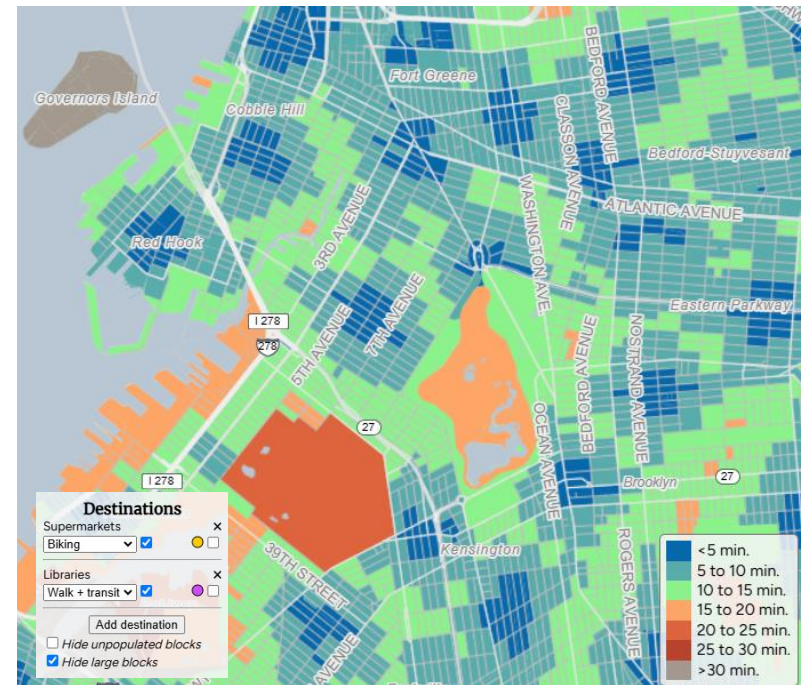
- buying property rather than renting as they can live in cheaper areas
- places that are better for raising families (near grandparents, better schools, etc.)
- preferred environment (sea change, tree change)

AI as a match maker

Household/Personal

Decisions on where to live could be made easier by AI.

Using pre-existing data, integrated visual analysis of the area, and customers stated preferences, AI could suggest ideal locations – including specific dwellings.





AI as a match maker

Corporate

Employers could also use AI to determine better locations for their offices.

AI could find locations that are appealing to the types of people they wish to employ, resulting in cheaper rent for the workspace and a better lifestyle for their employees.



Data driven tools

Corporate

Data can be used to make better business decisions.

Currently, things like office/factory locations are choices made by people using the limited information available to them. There could be several important factors they are not considering, including where their employees would prefer to live.

Data tools could match corporations to locations that are cheaper and a better fit for their current and future employees.



Data driven tools

District level

Developing new structure plans based on data to reach the best outcome for residents, employers, and the environment.

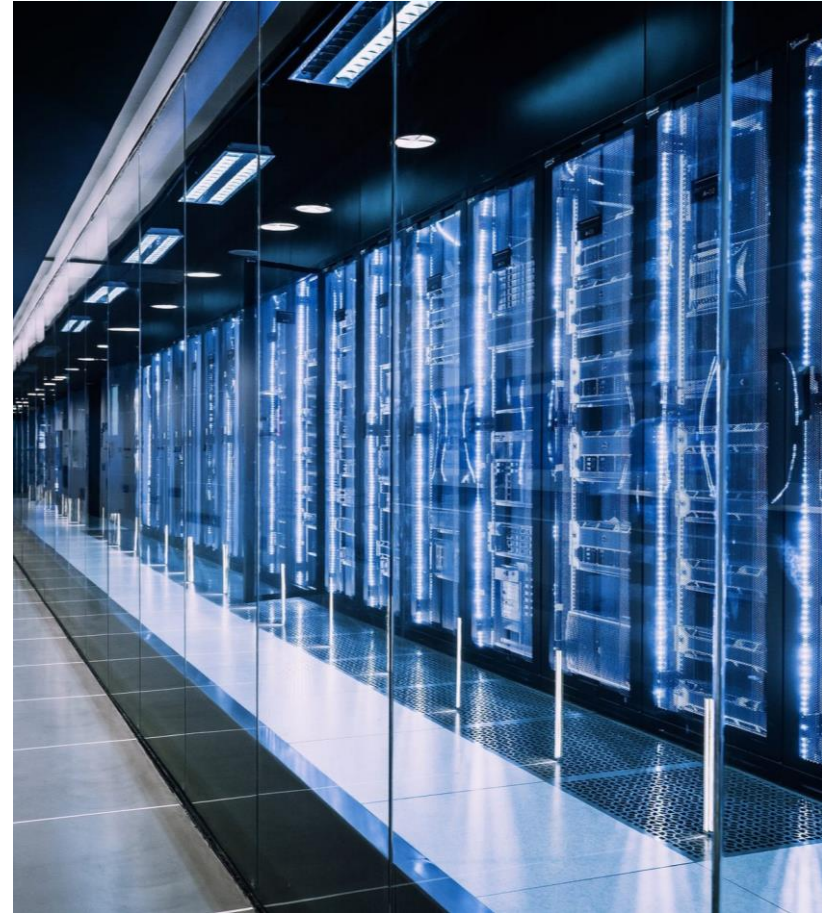
Precinct structure plans effect the lives of thousands of people and the local economy. Current processes rely on residents, businesses, and developers to advocate for themselves, which can produce inequality due to lack of resources. Data tools can be developed to advocate for all parties and balance the outcome for the optimal result.

Demand for Datacenters

District level

AI and Large Language Models (LLMs) require an increasing number of servers for data processing.

Demand for datacenters is growing to service demand, which need to be positioned close to terminal stations for adequate access to power.



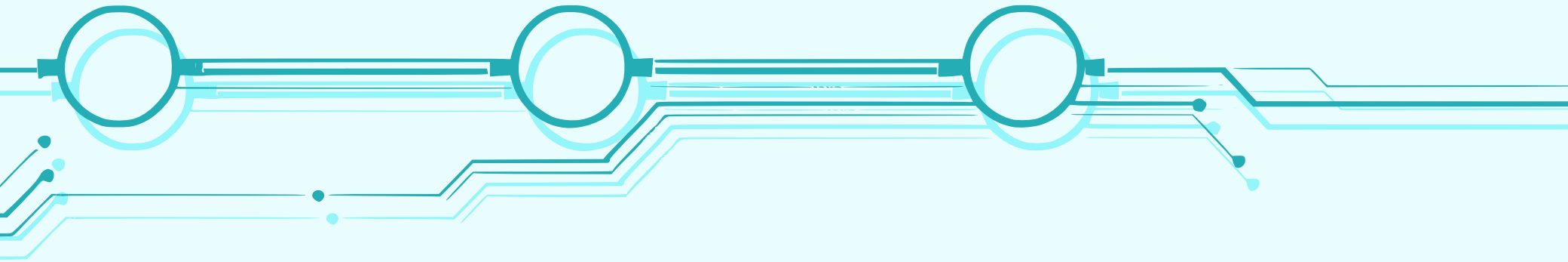


Data driven tools

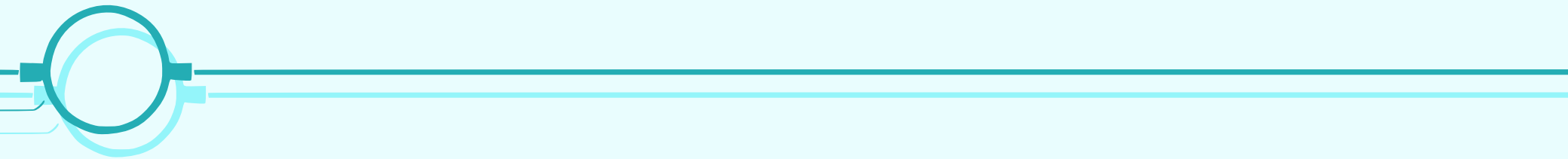
Major infrastructure

Projects with state and national significance should be planned based around as much information as possible.

Data driven tools could be key to optimising the selection and design of major infrastructure projects. New highway routes could be optimised for travel, logistics, budget and environmental protection. Feedback from all affected could also be processed and used to make adjustments throughout the planning process.



Autonomous Vehicles



Notable Autonomous Vehicle Companies



WAYMO

Currently performing supervised testing of autonomous vehicles

American

Subsidiary of Alphabet Inc.

Level 4 AVs

cruise

Currently performing supervised testing of autonomous vehicles

American

Subsidiary of General Motors

Level 4 AVs



TESLA

Not testing on public roads

American

Public company

Level 2 AVs



Baidu 百度

Driverless ride-hailing in China

500 vehicles operating in Wuhan, also operates in Beijing, Shenzhen, and other cities in China

Chinese

Public company

Level 4 AVs



Driverless ride-hailing in China, and has a permit to perform supervised testing of AVs in America

190 "robotrucks" in Beijing and Guangzhou, and over 250 robotaxis in Beijing, Guangzhou, Shenzhen, and Shanghai

American/Chinese

Public company

Level 4 AVs



Autonomous vehicles

While Tesla may be the most famous autonomous vehicle focused company, Baidu and Pony.ai have actually made it happen in China.

December 2022 – Baidu and Pony.ai are issued permits to test fully driverless autonomous vehicle with safety operators monitoring remotely

March 2023 – Baidu and Pony.ai won permits to provide fully driverless ride-hailing services in Beijing without safety operators

July 2024 – Baidu reveals it operates 500 vehicles in Wuhan alone, 400 of those fully driverless, with plans to reach 1,000 vehicles by the end of the year

October 2024 – Pony.ai has a fleet of over 250 robotaxis

Autonomous vehicles

Household/Personal

People may live further from the city when autonomous vehicles are commonplace.

Reduced congestion and travel times, and the ability to do other things while the vehicle drives itself could make travel time less of a factor in choosing where to live.

“Overall, these findings show that automated and zero emissions vehicles could change the way people think about their proximity to jobs and other services, making them more willing to live further from major employment hubs than today.”

p. 33





Autonomous vehicles

Corporate

Offices don't have to be in the city if they are still accessible, but they can be.

Companies may still want to co-locate in the city, and with autonomous vehicles they can do this and still have a wider pool of potential employees who are willing to travel in from further out with an easier journey.

Alternatively, companies can choose cheaper and more lifestyle-focused locations as employees and clients will be able to reach them easily and comfortably.



Autonomous vehicles

Corporate

Logistics change when drivers don't sleep.

Transport to and from locations will become more time and cost efficient.

Multi-hub networks may become cheaper and easier to operate for efficient last-mile delivery.

Warehousing can also occur further out for less time sensitive products, greatly reducing land/leasing costs for some businesses.



Autonomous vehicles

District level

Public transport becomes personal.

Standard public transport options (e.g. buses, trains, trains) are likely to become autonomous, which would allow for increased frequency and routes.

Individual-level public transport options could also be made available, especially for those with specific needs (e.g. transport for the elderly or people with disabilities) to increase accessibility to services and social activities.



Autonomous vehicles

Major infrastructure

Roads are for robots.

Major infrastructure projects need to be designed and built with autonomous vehicles in mind. Autonomous vehicles should be supported with good internet connections, and well-maintained roads with clear markings and signs.

Road infrastructure can also be built to communicate with autonomous vehicles (e.g. traffic signals, speed, school zones, changes to road accessibility, etc.).



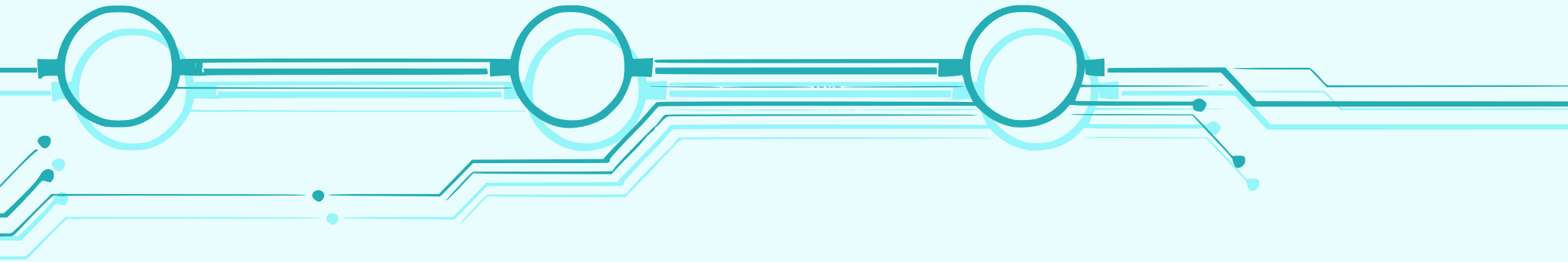
Autonomous vehicles

Major infrastructure

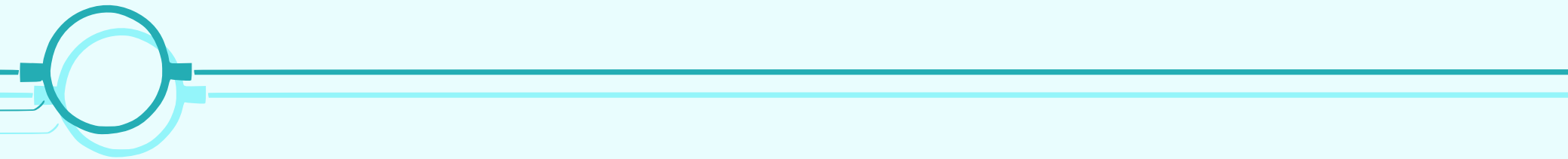
Car parks shouldn't be in prime locations.

Parking bays should also be provided in low-traffic areas for vehicles that are between journeys.

Currently, people have to park near their end-of-journey location. This means large car parks exist in locations that could be better used for residential or commercial uses and that roads lose lanes to road-side parking. Autonomous vehicles don't need to stay near their passengers once the journey is over.



Robotics





Robotics

Household/Personal

High density residential areas could benefit from new robotics.

For example, drones and associated parcel docks could deliver and store the parcel on site for collection by the resident at their leisure.

Multistorey building currently require either a concierge or the resident to be present to receive parcels. Otherwise, the resident has to collect the parcel from a different location.



Robotics

Household/Personal

People who live further from the city or stay at home more (e.g. retired, those with low mobility, etc.) could benefit from services becoming more available through robotics.

For example:

- Robotics (to complete simple tasks)
- Telerobotics (to work from home or provide care)
- IOT - internet of things (e.g. fridges that auto-order)
- Lifting devices
- Drones for delivery (home delivery on demand)
- Personal drone docks for terrestrial and air borne drones to safely deliver goods

Telerobotics

Household/Personal

Telexistence – Japanese robotics firm developing a robot that can be controlled remotely to stock shelves in convenience stores.



“[Mr Hikosaka] argues that this could be partly solved through deploying thousands of robots in locations where physical work occasionally needs to be carried out, and allowing companies to remote-hire people in order to operate the robot when needed.”

Telerobotics

Household/Personal

Ory Laboratory – Japanese robotics firm that operate “Avatar Robot Cafe DAWN ver.β” - a café where people unable to leave their house remotely operate robots to provide services.



OriHime-D avatar robots



Robotics

Corporate

Delivery drones make last mile delivery easy and potentially cheaper.

Currently, last mile delivery relies on a huge number of human drivers – both full-time and on demand. However, labour costs are high.

Delivery drones could reduce these costs and increase the range for deliveries, especially for smaller companies that cannot afford to employ drivers or are located further from high density residential centres.



Robotics

Corporate

Construction can be sped up with robotic assistance, reducing the cost and delays for new housing.

Construction costs are prohibitively high, especially for multi-storey developments. There are also too few construction workers currently in Australia to meet both infrastructure and residential needs.

Construction robots – either on site or at a pre-fabrication factory – could speed up the process and reduce costs.



Robotics

District level

Planning for drone delivery.

Delivery drones – both terrestrial and aerial – should be accounted for in planning and building design. Drone docks should be easily accessible, much like post boxes and parcel lockers.

Planned pathways for drones, including special lanes on roads or sidewalks, and unobstructed aerial paths, should be considered as a part of street design to increase safety and efficiency.



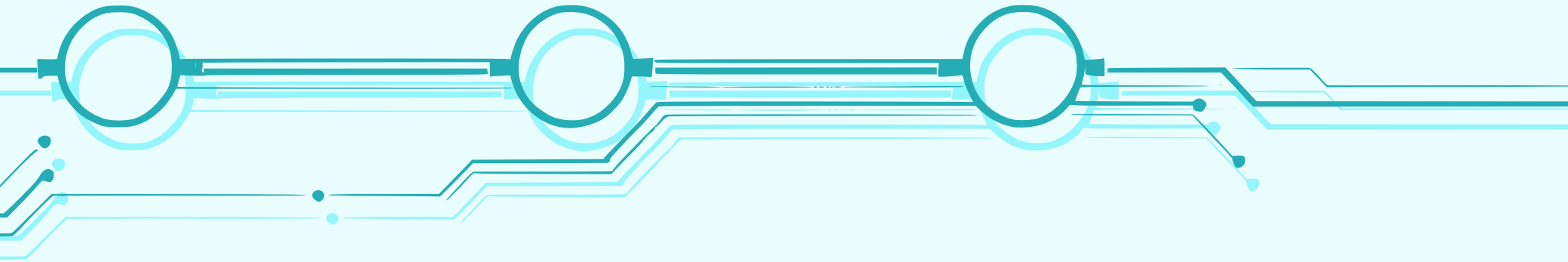
Robotics

Major infrastructure

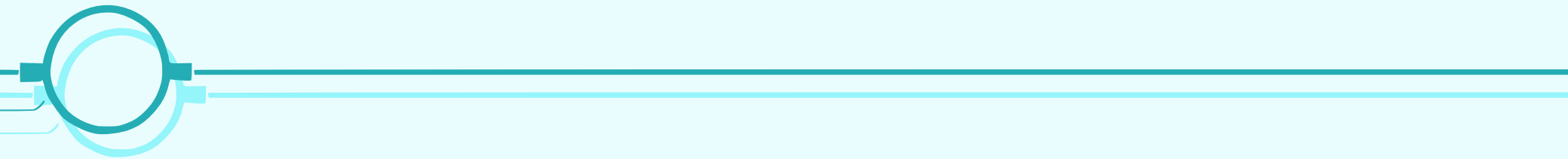
Integrating robotics into major infrastructure.

Robots and drones could be developed to aid in infrastructure maintenance and safety, and infrastructure should be built to accommodate them.

Sensors, storage bays and specialised signage could all be used to allow robots and drones to interact with infrastructure and the people using it to allow for cleaning, repair, and safety protocols to be conducted either automatically or remotely.



Conclusion





Conclusion

New technologies – especially AI (in the form of LLM and data driven tools) and AVs – are going to help people move away from the inner city.

Polycentric cities will become much more desirable as people can choose both a good lifestyle and a good job.

Commutes will be easier (even if they aren't shorter), locations will be better matches to residents wants and needs, and companies won't be as restricted in where they operate.



macroplan