A Hypothetical Society of the Future

Luís Felipe Saraiva Baptista

202X

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A HYPOTHETICAL SOCIETY OF THE FUTURE

Preface

As of the date of publication of this document, I, the author, am X. By expatiating my current beliefs and ideas, I hope to form a more concrete and justified worldview, and explain to others some of my ideas for the future.

I firmly believe our technologies should not adapt to our old systems of governance, bureaucracies and infrastructures, but instead be used as tools to create technically well designed systems that address the roots of the limiting issues of societies. Meaningful progress is achieved by making disruptive new technologies widespread, not through revolution or collective epiphanies.

This document begins with a description of a few implementation-independent objectives a hypothetical society should strive towards. These objectives were inspired by the United Nation's list of Sustainable Development Goals. Then, a brief summary of the entire text is given. The body of the document details my ideas for systems that in unison translate to a complete vision of a hypothetical society of the future, founded by technology, maintained by strong, diverse, and sustainable cultures, that achieve the described underlying goals. Every idea introduced was inspired in some form by current developments in our collective endeavor towards a more scalable and sustainable future. The chapters and sections can be read in isolation, but introduce ideas that work together in profound ways, so it is recommended to read the entire document to get the full picture. This document concludes with a brief look into my interpretation of what fundamental challenges stand in our way towards the described future - what are the limiting issues of societies, the systemic flaws that cause most problems common people face today, impeding progress.

Having defined my goals and these systems, in time, I will set a course for work in the directions I believe will most likely lead to real changes. I would like to one day help develop technologies with lasting positive impacts. With this being said, I understand that, in reality, meaningful progress happens very slowly. This document is a creative project, nothing more. It is my way of mapping out our overwhelming, limiting modern problems. If I can make sense of them, I stand a better chance of dreaming up the right solutions, and I might as well share my dreams.

Introduction - The Ideal Solutions

Overall Objectives

The

Overview of Ideas

In this section I summarize my ideas for the systems that achieve the described overall objectives. The collection of ideas are separated into four major groups: those related to the models of **governance**, the **infrastructures**, the **economy**, and **public services** of the hypothetical society. In exploring ideas I believe lead to ideal solutions, I have naturally come to describe a form of government known as a Technocracy, powered by advanced enabling systems and technologies. Henceforth, we will begin referring to this ideal society as **Technoland**, as though it existed today. Technoland can be more easily imagined as a society built from the ground up as described, rather than having evolved from one that exists today.

Key Points

Governance	**Infrastructures**
• Public finance • Legislative power • Executive power • Judiciary power • Law enforcement	• Secure decentralized ICT infra • Distributed sustainable utilities infra • Accessible high-tech housing • Functional & pleasant public spaces • Monitored & protected natural spaces • Smart autonomous public transport • Controlled & fair urban development
Economics	**Public Services**
• Secure decentralized financial system • Streamlined corporate management • Highly automated labor • Highly digital nationalized industries, focused on transparency, efficiency, sustainability, and self-sufficiency • Information-driven commerce • ??????	• Education • Healthcare • Welfare • Emergency services • Online public services

Practically every subject about societies and aspects of individual life is touched upon over the course of the four chapters, from birth to death, labor & leisure, human & natural spaces, macro & micro economics, art & science, and everything in between. Only a few subjects are not covered, notably, militaries and religion, as it is my belief that in an advanced society, war and faith should not meaningfully impact its operation.

Governance

The

Infrastructures

The Infrastructures of Technoland are the material facilities that support the high-tech lifestyle of citizens, in their smart homes and cities. They are characterized by several enabling technologies that simplify most human activities and make important aspects of life sustainable at scale.

Technoland's information and communications technology infrastructures enable secure and trustworthy information systems, that in turn power smart cities, and several important public services running in decentralized environments. Some of these include the decentralized financial system, and the identity management system. The ID system provides a simple, standard, and secure authentication interface for public and private services. Citizens can easily manage how they are tracked across the web, having control over their data. A novel approach to information security at scale actively detects and prevents the spread of malware. A robust disaster recovery plan for the information systems is also in place.

Technoland's utility infrastructures provision energy, water, waste management at scale sustainably for civilian and industrial uses. All utilities infrastructures make use of both large centralized facilities at the periphery of cities, and small-scale utility nodes dispersed within them. Energy production is overwhelmingly green, and storage is integrated into the infrastructures of cities. Water is taken from many sources, including basins, rain, the atmosphere, and the sea, and is used efficiently at homes and in industries, being treated and stored in a distributed way. Waste produced by communities and industries are mostly recycled, then sold back to companies, enabling a circular economy.

Technoland's residential infrastructures consist of varied and inspired green buildings, built for the masses, and bring diverse people together. The national residential strategy consists of investing in projects that adhere to a set of building quality standards, that guarantee they are safe, built in sustainable processes, house large numbers of residents, make use of sunlight and rainwater, include common grounds for residents, support hydroponic plant production, and many other things. The properties of buildings are explored in much more detail in the respective section.

Technoland's public spaces vary in many forms and functions, and are all within walking distance from most homes. They offer a nice reprieve from the habitual mass of buildings, offering open event areas, sports courts, playgrounds, and much more in green spaces blending local vegetation with a high-tech architectural style. They may be at ground floor or at the canopy of concrete jungles, and always catch sunlight. They play a key role in supporting utilities and transport infrastructure.

Technoland's transport system is autonomous, all-purpose, and fully electric. It is designed to transport people, mail, cargo, and city waste in a fully coordinated way, relying on a fleet of transport shuttles of varying sizes that can be combined to form larger vehicles dynamically, leveraging shared paths between different vehicles, minimizing energy use and traffic congestion. Widespread light transport units for the public complement the main transport solution. Emergency service transport is efficient thanks to the high-speed and secure communication of the transport infrastructure. Cities tend to be connected by vactrain lines.

Technoland's urban development plan operates on a long time scale, and is costly and highly controlled, but ensures that every city has national significance and significantly advances the development of the nation. Every city evolves in a controlled way, so as to ensure roughly equal public access to basic needs and services, and a good quality of living experience. The common stages of formation of a new city include its rationale, planning, initial investment, initial construction and are followed by continuous evolution. Technoland can best be described as a collection of highly coordinated collaborating cities.

Economics

The

Public Services

The

Governance

Public Finance

The first thing we need to understand about the governance model of Technoland is how it raises funds and puts it to good use in a transparent way.

The only currency is digital and there are no financial institutions. Authenticated individuals can clearly see where their tax investments go, from national, state, and municipal treasuries, through agencies or public organizations, all the way down to the payment of a resource, salary, or contracted service or project. Approved tax laws are directly incorporated into the autonomous public funds transfer network logic. Government agencies internally manage their treasuries, but are publicly monitored. Financial oversight, achieved through regulatory agencies and a body of volunteers, is a highly regarded occupation, responsible for upholding the public's perception of taxes as quality of life investments. Generally, citizens are heavily taxed from a small number of contributions, and most collected funds are invested locally. Citizens do not need to file tax returns. Theft, fraud, money laundering, embezzlement, lobbying, and corruption in the public sector are perhaps still technically achievable, but made incredibly difficult, and generally do not compensate compared to licit forms of wealth accumulation; opportunities are abundant and punishment is draconian.

diagram

This transparency is critical for upholding the public's perception of taxes as investments in quality of life, reducing corruption in government, and avoiding crises of faith in the government

Ubi is necessary, but because everything is automated, things are still cheap

Energy cost is protected (hedged), so the price of water, transport, web connectivity, etc is protected too. ?

Infrastructure industry

Fiscal Policy

The ministry of finance, what it does.
Controlling inflation: monetary policy, supply chain control, demand.
protecting the price of energy, and explaining how everything else depends on it.

Tally up everything that needs resources: public services, research, etc. be comprehensive.
One tax per ministry?

Attacking corruption

The Legislative Body

The

The Executive Body

The
The theme of the governance system: giving educated people more power to change the world around them. Candidate teams present electors with concrete plans of what they will do and how many resources they need to do it. Electors describe to a recommender system what kind of government they want - what ministries are emphasized, and the system presents them with possible combinations of ministries. The system works through SCs on a BC for security. People need to physically move to election booths, but they're much, much more distributed. Human oversight is not necessary.
Executive campaigns focused on equal exposure rather than targeting.
Electoral process focused on plans rather than characters - anonymously selecting independent plans (resource shifts) (with independent budgets) that do not exceed a total budget, based on present taxes and popular initiatives.
Blockchain electoral system: transparent, allowing multiple votes. ?

One tax per ministry? - they sell a plan for a price, like companies do.

The Judiciary Body

The

Law Enforcement

The

Financial crimes

Infrastructures

ICT Infrastructure

Technoland's information and communication technology infrastructure underpins the operation of many fundamental systems of Technoland, so it is fitting to begin our discussion about infrastructures with a look into how technology enables everything.

The computing hardware and networking equipment in Technoland are designed from the beginning for secure interconnection. The trustworthiness of many systems rely on the trustworthiness of the underlying fabric, so an enormous effort is made to ensure its security. Most computing devices, including personal devices, workstations, and embedded systems in cities have network interfaces paired with security modules. The hardware standards, network protocol stack, and communication protocols at every layer are designed to provide security (confidentiality, integrity, availability) of data for the distributed information systems that require the hardware over the internet. The internetwork of Technoland is managed by many companies that implement the network architecture with trusted computing equipment, within and between cities, following tried and tested principles for simple, seamless, and secure communication.

Smart cities, driven by hardened Internet-of-Things devices that continuously communicate with each other and gather useful data, enable a very high degree of automation of many city systems. Some of the noteworthy ones include the utility management systems, the transport system, and infrastructure maintenance systems. The collection of Internet-of-Things (IoT) devices supporting the public infrastructures of these systems provide data sources that are gathered and processed in a distributed way, to construct a continuously accurate digital representation of each city - its digital twin. Effectively, information from the collection of sources collectively contribute to the states of the digital cities, that can in turn be used to guide decisions and direct the attention of city administrators.

The collective computational power of citizen's personal devices in Technoland is used in distributed, fault-tolerant public systems to support several important applications. Some of these include the decentralized financial system, the identity management system, and computationally intensive scientific research applications. Effectively, devices allowed to participate constitute a distributed supercomputer and mainframe so that important applications can be run in a decentralized environment, ensuring consensus about the state of these systems, eliminating points of failure, and putting (otherwise idle) compute infrastructure to good use.

The distributed identity management system plays a key role in providing a unified and secure authentication interface for public and private services. Participating nodes maintain a record of all members of society in a sharded decentralized list with global consensus. The underlying fabric is designed to handle the consensus protocol extremely efficiently. Identities are composed of inherent human attributes such as name, sex, parentage and biometrics. Occupation status, as well as financial, legal, medical, academic and other public sector data is linked to identities, and private organizations can link data as well, but access control capabilities ensure any one group can only access relevant information from an identity. An individual can at any moment access all their linked data. Identity data is distributed and stored redundantly, as well as centrally and securely backed up at interior and foreign sites; the chances of any data being lost or corrupted is astronomically low. Authentication to services always consists of multiple factors, with some public services requiring three (biometric scan, e-id card, password) or more factors. There is a standard identity registration and reverification process. Some public finance legislation ensures there are always cheap and secure personal computing devices available on the market for the public to use to access these services. Deaths cause identities to be archived securely outside the active distributed system, so the system remains efficient for the living.

Web activity tracking can be fully turned on or off, or can be customized. Tracked personally identifiable information is only accessible by the user or by parties given explicit permission. Tracked data can be easily seen and deleted, and how it is used is always made clear. Online platforms are not allowed to sell personally identifiable information on their users, ads are still highly personalized. Laws ensure civilian data cannot be used for mass surveillance, or to deliver targeted propaganda.

The ICT infrastructure includes cable, cellular, drone, and satellite networks, for different applications and connection redundancy. Nevertheless, some systems may fail. In the event of a natural or human-induced disaster, robust disaster recovery plans will be invoked to keep all essential functionalities of the infrastructure available.

Utilities Infrastructure

Technoland's utility infrastructure covers energy, water, and waste management. Generally, across these three utilities, for every city, the management solutions rely on a hybrid approach of distributed and centralized processing facilities, so efficiency is maintained while keeping the system fault-tolerant. For this, there are infrastructures like energy stations, batteries, water treatment stations, and waste recycling stations, all of varying sizes, connected to electrical, water, and sewage networks. The utility stations may be large centralized facilities at the edge of cities, or small expandable utility nodes providing their capabilities inside cities. The utility networks can monitor flow (of energy, water, sewage) through links and raise alerts when faults occur.

Technoland's energy supply infrastructures produce, transport, and store electrical energy for civilian and industrial uses. Energy production is overwhelmingly green, relying primarily on nuclear energy (fusion and fission), and is complemented by renewable sources (solar, wind, wave), and green hydrogen fuel. Solar panels covering the rooftops of most cities effectively serve as virtual power plants, offsetting the electrical network demands substantially. Energy storage relies on diverse battery technologies that are integrated directly into the infrastructure of cities (e.g, building materials, elevators, electric transport units, dedicated facilities) and are complemented by energy-dense supercapacitors. The collection of light storage solutions effectively serve as a virtual superbatteries, offsetting energy production demands substantially. Thus, energy production and storage is distributed throughout homes, buildings, cities, and dedicated stations, and cities are partially self-sustaining.

Technoland's water supply infrastructures purify and transport water for all kinds of civilian and industrial uses. Water is sourced from nearby drainage basins, or from rain or the atmosphere. The former source can be collected above or below ground in lakes, rivers, or aquifers and treated in centralized purification facilities. In coastal cities, sea water can be desalinated, used, then introduced into basins after being treated again. The latter source is generally collected in cities - in streets, or building rooftops - then treated in water purification nodes spread throughout the city or in buildings before being released into the clean water supply network, or to a particular building's tank, helping it offset some demand from the network. Water is used incredibly efficiently in cities and in industry, so there is always supply. Some solutions that help minimize water use include large-scale hydroponic and aeroponic plant farms in residential buildings, spraying showerheads and taps in homes, and highly controlled water usage, treatment, and reuse in chemical and manufacturing industry processes. Water fountains that can be used for free are spread throughout cities.

Technoland's sewage system, which is separate from its water supply system, treats wastewater produced by communities before reintroducing it to drainage basins. The chosen approach is, like other utilities, hybrid, using large centralized facilities, and dispersed sewage treatment nodes, that can either treat it or transform it into biofuel.

Technoland's waste management system recycles most waste produced by communities, then sells the recycled raw resources back to companies. Residential buildings are designed to incentivize garbage separation by having a set of garbage chutes in apartments or floors leading straight down to autonomous container vehicles that transport the waste (assumed to be partially sorted) to recycling facilities. An effective educational and cultural effort, combined with clear product labeling, have ensured that in practice, citizens are aware of the waste they produce, and send most of their discards towards the correct chutes. A tax is imposed on each community depending on the measured amount of food they waste, to decentivize this practice. Garbage collecting autonomous vehicles do not belong to any one particular building, but roam the city and select buildings needing them at that time. There are usually a few garbage collectors waiting idle at each building so they may be promptly swapped in once others fill up. Waste containers in public spaces also drive themselves to recycling facilities automatically. Recycling facilities may be large and centralized at the periphery of cities, or distributed within cities as waste recycling nodes. Recycled resources are transported from facilities to large warehouses, then sold wholesale to companies, which have fiscal incentives to participate in the circular economy.

Utilities management and maintenance is important and expensive; a significant amount of taxes are dedicated to keeping cities clean, and their systems working. To this end, several utility management nodes/stations keep track of (and can control) the autonomous infrastructure at different regions. The digital representation of the infrastructure, including network flows and production/storage levels, is continually updated by robust sensor networks implemented with redundancy. Augmented reality applications further help ground teams in visualizing and fixing problems that arise.

Housing

Housing for the Masses

In Technoland, residential construction projects are focused on scalable, high-tech green buildings, dense with people per unit area. Through collaboration efforts of standardization organizations, and architects and engineers of many companies, the construction of urban residential projects have matured to a consistent level of quality across the industry. The result of these efforts was the establishment of a set of properties all residential buildings share, ensuring they are safe, comfortable, sustainable for a long time, and incentivize community involvement. The residential buildings of Technoland are true architectural and engineering marvels.

On the one hand, the high baseline standards make it difficult for smaller construction companies to participate in the development of residences, funneling a lot of public funds into few companies, also leading to a high concentration of workforce. On the other hand, the concentration helps drive continuous innovation in the field, and facilitate the sharing of knowledge and experience across the industry. Projects of varying scales are undertaken depending on demand and what's economically viable for the construction company, but when (especially larger) projects present design or production innovations, these may then become standardized for future projects.

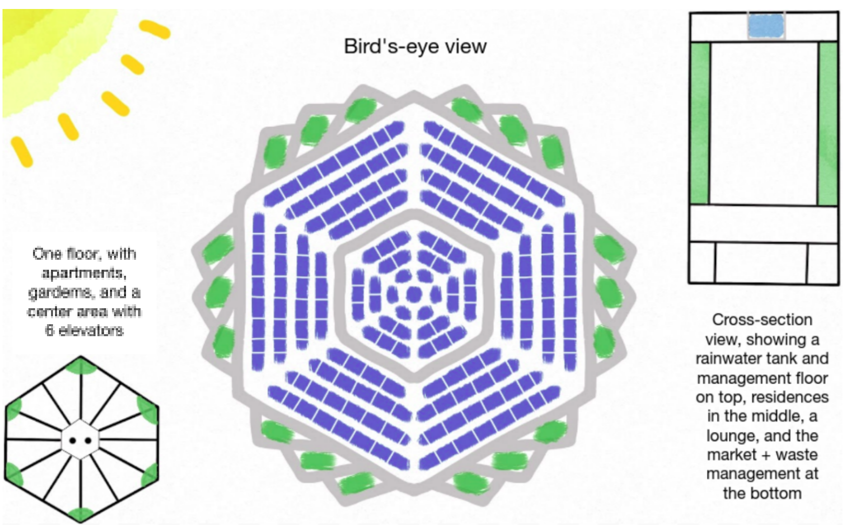
Because cities are planned and evolve such that residential buildings are roughly equally near to all major functional urban areas (schools, hospitals, offices, malls, etc.), the price of any two apartments of similar quality is roughly the same independently of where it is bought. There are no richer or poorer zones. This, combined with assurance of roughly equal living quality standards, cost-efficiency (in density of people per area), and concententration of participating companies facilitates the regulation of apartment prices, in turn making them economically accessible to most people. Furthermore, projects can be partly subsidized, and due to their close involvement with the public sector, companies are forced to be especially transparent with their spending.

Construction is continuously done for as long as there are people and families in need, and statistics on this are accurate. Many buildings are designed to be vertically expandable, starting small, but eventually housing hundreds of residents. Generally, this approach has led to highly scalable cities that actively prevent urban sprawl. It is important to note that this chosen housing strategy works for Technoland because its population growth rate tends to be relatively stable, its economy allows it, and its workforce is competent. This approach would absolutely not have worked if not for these and other subtler reasons.

Some of the major properties of residential buildings are the following:

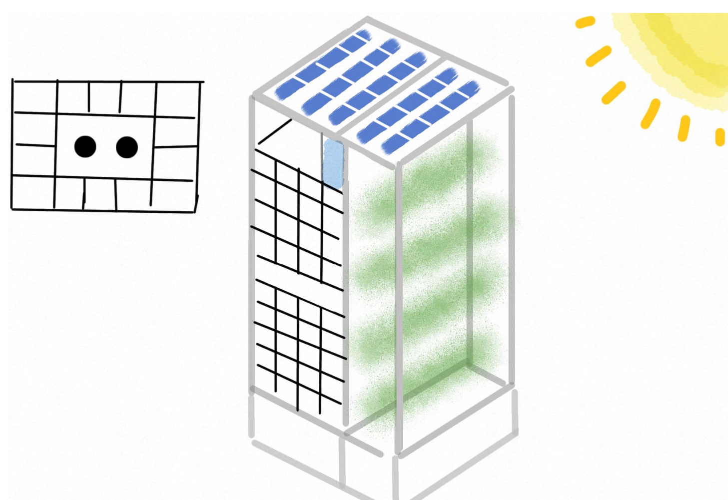
1. Comply with strict safety regulations and be resistant to relevant weather events.
2. Be constructed in a low emissions process, using sustainable materials.
3. Comply with comfortability standards for the project tier.
4. Catch sunlight for energy generation and efficient natural illumination.
5. Catch and treat rainwater for plantation or domestic use.
6. Have efficient elevators that can store and release energy and predict calls.
7. Have garbage chutes in apartments to simplify selective garbage collection.
8. Support hydroponic gardens, either in apartments, or in dedicated sections of the building with automated harvesting.
9. Have a small market for essential items and foods.
10. Have a common area for community involvement.

A few example compliant building architectures are given below.



This building is a vertical stack of hexagonal floors slightly out of phase with each other, with twelve apartments per floor, and the dedicated sections - lounge, market, and waste management. Solar panels decorate the roof, and its slight inclination funnels rainwater to the tank. The management staff regulate energy & water collection, the market, and more.

This building splits its sides into a residential, and a plantation side, since it reliably catches sunlight on one of its faces every day. There are two groups of (3) elevators and fourteen apartments on residential floors. The lounge takes up a floor in the middle. At the top lies the management station while a market and a garbage collection .



There are many variations on such organizations, and many other fundamentally different and unique ones. There may be more or fewer of a section type, and different ones too, like sports courts, pools, collective gardens, kitchens, and several more. The possibilities of residential buildings are endless, and every design feels inspired.

Beyond giving most urban citizens comfortable and dignified lives, the housing strategy of Technoland also makes a real attempt at reducing hate and prejudice towards differing groups of people, by diversifying residents and incentivizing the formation of small communities - by getting people with different contexts to coexist. There is one unified apartment market platform that all construction companies use. Available apartments are offered at a discount to customers depending on the distribution of ethnicities and other characteristics of residents throughout the buildings, in addition to other variables like the customer's distance to work. The recommendation system attempts to optimize the mixing and any customer-specific constraints. Residents can opt-in to be a part of a virtual social group with their neighbors, and they can easily see who lives in the community and contact them. People can easily chat, see what interests or activities they may have in common, schedule events on common grounds, form clubs, and make other plans.

Apartments are roughly tiered, and quality standards are comparable between units on a tier. The most common apartment type is one with three rooms (one being larger), a bathroom, a kitchen, a living room, and a small veranda. Other options vary in size and number of compartments, and in the types of additional compartments there may be, like work or dining rooms. At most, the largest apartment may be, say, ten times larger than the smallest one, to limit disparity.

Buyers have the option to furnish the apartments themselves, or request that they be furnished as per some specification if they are the first buyers. Upon building completion, a coordinated furnishing service furnishes the requested apartments, following selected templates, or fully buyer-customized interior designs. The furnishing service includes appliances and networking equipment. Most furniture and appliances are smart and can communicate with each other.

The applications of IoT communication are varied and they profoundly impact the living experience by assisting in or automating many tasks. A few examples include automated cleaning, atmosphere regulation, garden maintenance, grocery list making (based on current fridge contents, recommended dishes), remote utilities management, and best of all, hot bath preparation. Food is prepared, clothes are cleaned and dried, and dishes are washed automatically. For more details on the extent of the capabilities of smart homes, see the section on the industry of household products.

Apartments are designed to leverage natural illumination and airflow. In some buildings, solar tubes may bring sunlight from the roof all the way down, dispersing sunlight on residences, or on internal hydroponic gardens that would otherwise not catch a lot of sunlight. On buildings that catch a disproportionate amount of sunlight on one of its faces, solar panels may be installed on that face, or it may be leveraged for the gardens, or transfer heat throughout the building, or be used in other ways.

The common grounds of a building are usually a floor dedicated to promoting community involvement. They are usually a nice, open lounge. They might include some tables, chairs, recliners, sofas, TVs with media streaming services, a kitchen with dining tables, bookshelves, a bar, table games (ping-pong, pool, etc.), and a lot more. There, people may also find common useful items for borrowing (e.g, tools), or leave unwanted items for donation (e.g, clothes, toys).

The high number of residents per floor on an average building could have had a catastrophic impact on the elevator usage if they were not designed to support it, but they manage to avoid cramming and endless waiting. The number of elevators depends on the capacity of the building, so there may be, say, one for every three/four apartments on each floor. Elevators can be configured to give preference to calls from different floor intervals, increasing response time. Schools, universities, and businesses tend to operate between standard start and end times, so the elevators can be configured to pass from top to bottom or bottom to top stopping at every floor at definite times, catching or dropping people like a bus at its stops. Residents may securely share their schedules with the system so it can plan these stopped rides, and inform residents of when it will pass by their floor. Elevators tend to be physically large to support this. Beyond elevators and stairs, if there is room for it, indoor slides, poles, lines (that automatically suspend or lower people), and other means for vertical transport can be installed if deemed necessary to handle the traffic. The first few floors are usually accessed by stairs, and the prevalence of remote work lessens the demand for vertical transport, so waiting times are usually fine on most days.

Every floor, and some home apartments come with a set of garbage chutes leading down to containers in large autonomous vehicles that automatically transport the waste (assumed to be partially sorted) to recycling facilities. In practice, thanks to education and clear labeling, residents tend to correctly sort non-durable trash items. Garbage collectors do not belong to any one particular building, but roam the city and select buildings needing them at that time. The garbage collection and market sections of each building tend to share the base floor, and the market can also leverage the garbage collectors to dispose of their waste. There are usually a few garbage collectors waiting idle at each building so they may be promptly swapped in once others fill up.

The market of some residential buildings provides frequently needed items and groceries to its residents and outsiders, to simplify access to these items, and reduce traffic load in cities. Markets also help reduce the cost of apartments, offsetting some of it into the price of groceries for residents, helping construction companies profit from the investment. Markets are cashier-less, and partially automated. They are limited in size, offering an essential set of items and groceries, merely complementing supermarkets. Residents can stay informed on the availability of items at their markets, and explicitly share what they need to have it provisioned in the near future, if enough residents request it, or configure their smart fridges to request these automatically.

Buildings with many segments like these tend to have a management floor and associated staff that oversee everything: solar energy production/storage/usage, water collection/treatment/usage, crop production/consumption, elevator usage, market purchases/inventory, building security (physical & cyber), and many other things. Residential content distribution servers that cache frequently accessed content (e.g, top movies, music, games) and serve it to hosts within or in the area near the building can also be maintained at the management floor.

Housing for the Homeless

The final component of the residential strategy of Technoland are the homeless shelters. Their purpose is not only to keep people in dire situations off the streets, but to help reintroduce them to society as productive members, and into residential apartments. There may be one shelter per city. They are dense with beds, and mostly self-sustaining. Their maintenance cost is minimal. Inhabitants are promptly presented with opportunities for work (in simple jobs like construction or maintenance) and education on entry. If they take it, and agree to live in groups, and participate in therapy or rehabilitation programmes if necessary, then they may move to a proper apartment and slowly pay off their debt.

Public Spaces

Urban Spaces

Experienced and creative urban planners are involved with the inception of any new city that is to be established on Technoland. All cities are meaningfully distinct, and leverage their natural environment to assert their identities. Cities are people-centric, providing high walkability and interesting urban spaces and pockets of nature.

Urban parks are roughly uniformly distributed, and vary in form and function. Each one is handcrafted by urban planners and their designs are inspired. Some are lush, others more open. Some are tall, or wide, or both. Some are flat, others have hills or go underground. Some are at ground level, others at the canopy of the concrete jungle. Some are square, round, or linear, cutting through an entire city. Most of them blend a high-tech architectural style with nice vegetation. They all necessarily catch sunlight. Some include ponds, kid's playgrounds, sports courts, open-ended indoor spaces used for exhibitions/events, space for kiosks, and other areas. Monuments can hardly be found, as citizens tend to agree there are usually better ways of spending taxpayer money, but outdoor art and public sculptures are commonplace. Still, if the people agree that one distinguished individual should be immortalized, they can easily make that wish come true with popular initiatives. Some of the cities' utility nodes - that store energy, treat rainwater, recycle garbage, etc. - may also be situated in parks, playing a role in Technoland's distributed utility management. The cities' public transport shuttles may also lie at the parks while idle, alongside other light transport units like bikes and scooters. Many parks have water fountains, bathrooms and charging stations for devices. While smaller parks may offer little more than a nice place for a picnic, larger ones may have open automated vertical gardens that catch solar and wind energy, store rainwater, and treat waste. Larger parks are also used as locations for popular events, like concerts or fairs.

Rolling Green Ribbons (proposal), Los Angeles

Supertree Grove, Singapore

Natural Spaces

Technoland's natural environments and resources are controlled by the nation's environmental protection agency. In practice, this involves monitoring several aspects of its geography (e.g, terrain, fauna & flora, water resources) with the help of drone, satellite, and sensor networks. The collection of monitoring systems allow for a complete and up-to-date digital representation of the geography to be constructed, and used for several management and research purposes. Each monitoring system tracks a single aspect of the natural geography in real time, and is managed by specialized teams, with remote and on-site workers. A constant maintenance effort is required to keep all monitoring systems operational.

The entire history of the metrics of each monitoring system is made available to both the specialized teams as well as to the general population via feature-complete web applications, providing several kinds of visualizations of the data. Status reports are automatically generated daily, summarizing all metrics, changes, and trends in the observed data. This monitoring system also plays a key role in helping prevent or mitigate natural disasters (e.g, fires, storms) by raising alarms for the specialized teams and communities affected by them. The atmospheric monitoring system observes climate trends for forecasting and tracking pollutant emissions.

Transport

Technoland's transport system is autonomous, all-purpose, fully electric. It is designed for people, mail, cargo, and city waste. For public transport, the system is designed to leverage shared segments of trips among users; a fleet of automated shuttles are available to the population, and any time a user needs to travel through the city, they must simply specify their pickup and dropoff locations, and one of the shuttles will take them to their destination, through a path determined by where other users of the network need to go. If a shuttle is not in use, the system sends it to a region where it expects future rides may begin and recharges itself; the distribution of shuttles adapts to global transportation needs. They also collectively serve as a virtual superbattery for the city, releasing energy back into the grid when needed. All vehicles are real-time systems, so they are continuously aware of their surroundings and communicate with other vehicles, roads, and pedestrians securely and at extremely low latency.

Shuttles support varying capacities of people. The most used capacities are for one, two, or four people, in Solo, Duo, and Quartet transport units respectively. These can be physically joined together by a 8-linker unit, that can link shuttles with a combined total capacity of eight people. For groups of up to eight or sixteen people, the less common Octet and Hextet shuttles can be used, and linked by 32-linkers.

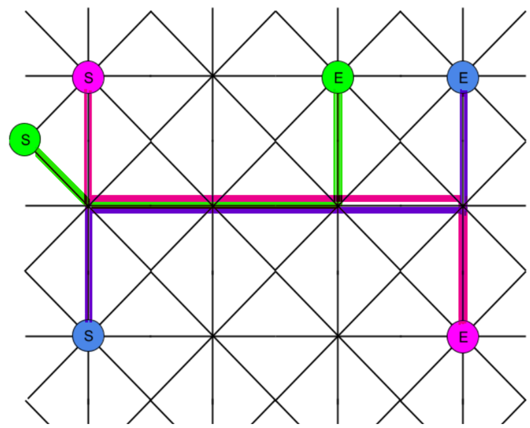
Citizens can call a shuttle from anywhere to any destination (in the city) using an app for mobile/wearable devices. They can quickly call it for themselves and a nearby group of contacts. In the latter case, once called, the contacts must confirm they will join, and after confirmation, the call will be broadcasted. Upon the shuttle's arrival, passengers are given some time to get in before it starts moving again. They may share the shuttle with other passengers already inside. Passengers are authenticated so if someone who didn't call the shuttle gets in, they will be kindly asked to step out.

If multiple user paths are similar, they are combined for the duration of some shared segment; their vehicles will attach to each other via a linker, and each engine's output will be rebalanced to more efficiently move the larger combined vehicle. Once the shared segments have been traversed, the transport modules are separated to complete each users' trips separately. The combination and separation improves energy efficiency, especially for larger groups, and prevents congestion.

Citizens are charged for every ride they complete, but the cost is accessible. The autonomous transport infrastructure replaces conventional cars, vans, and buses, and the industry has scaled to the point of handling the demand for transport units in every city throughout the nation. The automotive industry is heterogeneous but all shuttles comply with quality and performance standards.

Synchronization & signaling between vehicles and pedestrians is fully dynamic. There are no traffic lights for vehicles, as their communication ensures they accelerate, decelerate, and halt to ensure no crashes, while maximizing flow. Pedestrians are signaled by panels on shuttles, and this depends on the number of pedestrians waiting and vehicles passing by a crosswalk. Generally, a 'halt' is signaled when approaching vehicles are transporting more people than there are waiting, and 'proceed' is signaled otherwise. Timers also switch the signaling so no group is ever waiting for too long.

Hyundai 'Mobility of Things' Illustration for CES 2022



Example of combined shuttle paths

Light transport units are a secondary component of Technoland's public transport strategy. Bikes and scooters are widespread, and can be used easily through the official transport app. Users are charged monthly for using bikes, and in real-time as they make their trips with electric bikes or scooters. Users must always start and finish their trips with electric light transport on one of the many charging stations distributed throughout the city, or risk paying a fine. The location of light transport is constantly monitored so city maintenance worker robots can deliver outstanding units to a station if there are any. Citizens can also purchase their own light transport units, which can be self-driving, and make use of the city's charging stations.

The business aspect of the public transport system is relatively straightforward. The automotive industry is represented by several companies that produce diverse shuttles and light transport units for local governments, who purchase a supply that matches each city's demand. Shuttles come in different tiers of quality of comfort, and provide the transport service in ranging priorities (trip speeds), but are similar in form and function within a tier. Shuttles also play a role in the advertising industry, displaying relevant advertisements to passersby, further decreasing the service cost.

Alternative modes of public transport over land, water, and air exist too. These include urban rail (for especially populous cities), ferries, gondolas, and aerial drones. They play a merely complementary role to the main shuttle and light transport fleet. Nevertheless, working groups continuously investigate new forms of public transport.

Ambulances, police cars, fire trucks, and other emergency service vehicles are given utmost transport service priority. Once deployed, their paths are broadcasted to vehicles and roads along it so vehicles clear the way in a coordinated manner, and halts are signaled at crosswalks as the emergency vehicle approaches.

As mentioned in other sections, Technoland’s garbage collecting service is also integrated into the autonomous transport system, using specialized container shuttles that dock into the base of buildings and accumulate a specific type of trash, that are then transported to one of many recycling centers once they fill up.

Technoland’s postal service also uses specialized shuttles for transporting varied mail items. Some variety exists among mail shuttles, enabling the delivery of small, medium, and large items on a variety of standardized packages. Endpoint delivery is also automated, as packages are inserted into specific slots in buildings, or otherwise left on the floor or delivered to a person. All packages come with a secure geolocation tag enabling real-time tracking. Once they are delivered, a receipt confirmation may be required, but not always, as the system may consider a delivery as complete when the geotag confirms it has reached its destination. The delivery service is costly but a good part of the money is returned when the package is returned to the postal service, either to a shuttle or a local post office; packages are reused. Small, high-priority packages can be delivered via drones for a higher price.

Cargo transport in cities is also done on large, specialized container shuttles, and can be sold or leased to companies. They are autonomous and are managed via a standard interface that can be integrated into different companies' logistics systems. They can be sold between companies, and their ownership is shown on their exteriors.

Neighboring cities are connected by vactrains that are mostly used for cargo transport, but have limited passenger capacity. The vacuum lines are pretty much always in use; cities are always sending each other resources, so inter-city transport is fast and accessible. More conventional means of inter-city connection through ground, water, and air lines are also available for citizens, who must reserve a ride in advance.

Urban Development

Technoland is a collection of collaborating cities, where every city has some national significance and significantly advances the development of the nation as a whole. Furthermore, every city is developed in a controlled way, so as to ensure access to basic needs and services, and a good living experience to all. This in turn orientates most citizens toward productive life paths, and enables a true meritocracy. To show how all this is achieved, we will go through the common steps in the establishment of a new city, pointing out important considerations that need to be made at each one. Technoland's urban development process is long, but reasonably well structured - enough to be explained in general terms. We will assume there already exists at least one city in Technoland, and that city establishment is always a calculated expansion effort of existing cities. Thus, cities do not form naturally from dispersed peoples.

Rationale

First of all, who decides when a new city should be established? The executive body of the federation of Technoland has a say in this, but ultimately, ordinary citizens should approve such costly expansion efforts.

Why should a new city be established - what good reasons could motivate its existence? First, it may be necessary to create a new city to accommodate a growing population in the collection of existing cities, if these cannot be scaled further. Second, there may be some abundant natural resource in national territory with potential for stimulating the national economy, that could also benefit the economy of a city near to it. Third, there may be some coast with great potential to serve as a checkpoint for maritime trade routes, or in other words, that could exploit a commercial opportunity with ports. Fourth, for a certain distribution of cities over national territory, it may be sometimes desirable to establish a city to serve as an intermediary link between other distant cities that would otherwise not be connected. There are many more reasons why a city should be built, and each one has strong economic motives.

Where should a new city be established? This is partially determined by the reasons behind it, but other more specific considerations can be made. If a new city can be established near existing ones, it could initially share some existing utilities infrastructure - it could be much cheaper to build. Otherwise, if that city's purpose is to exploit far away resources or commercial opportunities, then it would have to be built and survive more independently of the rest of the nation, that would lead to a greater cost, but that would be, in principle, offset by the economic activity it stimulates. Cities built in more isolation will naturally evolve in ways meaningfully distinct from the rest.

How should a new city connect to existing ones? The first implemented infrastructure in all expansion efforts is a direct, preferably high-speed connection for physical and data transport from an existing city to where the new one should be built. This is done to enable coordination and an accelerated transfer of resources and people for subsequent development efforts. All cities are eventually well-connected together by various paths over land, water, and air, and these connections should be established as early in its development as possible. If the next city to be established is more isolated from existing ones, and a long direct high-speed connection is infeasible, then a simpler connection should be created, and the high-speed path will need to be built slowly as the need for establishing intermediary cities emerges.

These initial considerations are informed by the current stage of Technoland's expansion strategy, that is restrained by the amount invested, and seeks to minimize construction time, and maximize the expected gains from created economic activity. Thus, the expansion strategy adapts to Technoland's current socio-political state of affairs (determined by thousands of variables), and the current state of the national economy. For example, establishing a distant city with the intention of creating commercial ports that enable the exchange of valuable resources, connected to other cities by long simple lines would be a bigger gamble than establishing one closer by, more tightly connected, but with a smaller economic impact. Whether the gamble is taken or not depends on how prepared and willing Technoland is for it.

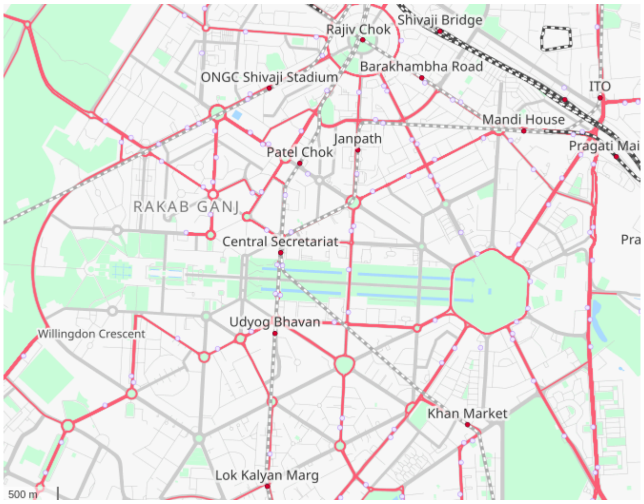
Planning

The planning stage of a new city begins when its rationale has been well defined and approved. It begins with the initial specification of the project's scale, and appropriate call for investment and budget allocation. The initial size and population capacity of a new city reflects the amount invested on it. At the planning stage, the initial layout begins taking shape: the ICT and utilities infrastructure, placement of urban areas, and design of the transport network, for the natural environment they will be built upon.

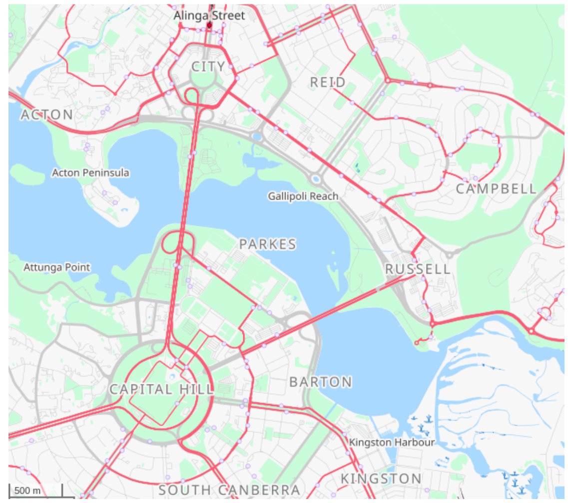
Cities are designed for efficient transport. The transport network design assures multiple efficient and safe paths exist between any two points in the city by using major lanes slicing the city, many minor diagonal lanes, tunnels and viaducts, roundabouts, diverging diamond interchanges, and many other structures. Pedestrian paths and light transport lanes are also included in the design. The street naming scheme is intuitive.

An initial assignment of essential facilities to urban areas is then chosen - these are residences, urban parks, schools, hospitals, police and fire departments, utility nodes, administrative buildings, and other such infrastructures. Generally, these are all distributed over the geography of cities so no one area has a concentrated population and all have easy access to basic needs and public services.

Some of Technoland's urban planners' inspirations:



New Delhi



Canberra

Initial Investment

Raising funds and public interest for a new city is a necessary step between planning and production. After the initial proposal and plan have been reviewed and approved, city establishment projects seek out construction companies that could build its parts. Then, the idea of the city takes on a more public form, as campaigns incentivizing participation and investment in the new city are launched. Specifically, many city administrations of technoland announce the project, promote fundraising events, sell apartments to initial residents, employ new public workers, and sell land to businesses. Over time, having accumulated enough interest for the project, plans for the urban infrastructure that will fill up the delimited urban areas start being drafted. Importantly, the project does not go forward if businesses don't commit to opening offices, job openings, and shops; the economic activity of the city must start strongly. If interest is big enough, then the initial connection from a fringe city to the new one can start being built. Gathering funds and (public and business) interest may take several years; it is the stage in urban development that either makes or breaks projects.

Initial Infrastructure

Having accumulated enough funds and interest to start building the city, a schedule for production is created, so it can be gradually populated as it is built. But before this, a path for physical and data connection is established, the workforce is transported to the site, and temporary living facilities made from prefabricated mobile homes are set along with mobile utility nodes. Then the ground is cleared, and the initial ICT and utilities networks start being implemented. After that, construction starts on the roads.

Meanwhile, scheduled construction companies involved with the building of facilities in urban areas start pre-production. As roads are built, the sites are prepared for production, then production begins. This takes a while and projects are almost always delayed and go over budget, but they eventually complete, and the next phase of scheduled construction efforts begins. This process repeats many times until the land is transformed into an initial and presentable version of the city it shall become. Only then does the city start being populated in rounds.

It can take a decade or more for a new city to materialize from its initial plans, but every time a new one emerges, they represent a major step in the nation's economic, social, cultural, and scientific development. The first few cities established by this process took quite a long time, but eventually the workforce (planners, architects, engineers, construction workers) became accustomed to the fast pace of development, and learned process optimizations have hastened the cycles. In every case the long-term investments have paid out for all involved. Despite Technoland's relatively stable and rising economy, due to the accelerating pace of technological evolution, only a few cities are ever in construction at any given moment; processes and infrastructures are always evolving, and work is also continuously done in established cities to help them approach their full potential.

Evolution

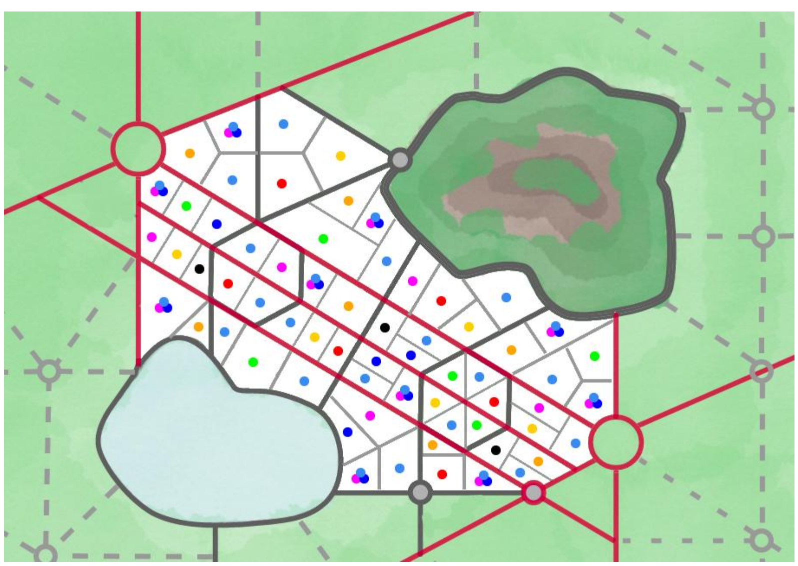
The guiding principle behind city evolution efforts is that by giving everyone good and roughly equal education and work opportunities, and base starting conditions, then people's merits can more directly be attributed to their efforts, and they can be rewarded more directly. In other words, Technoland can operate as more of a true meritocracy. Systemically minimizing economic and social disparities, and investing heavily in education have led to the formation of entire generations of incredibly capable workers, and the first part of this equation has everything to do with how the evolution of cities is controlled.

Concretely, residences, parks, schools, hospitals, emergency service stations, and diversified points of business and commerce are spread out and balanced over the geography of cities, such that the notion of city centers, suburbs, and low/high income neighborhoods fades away, and everyone has roughly equal access to facilities of these types. Another way of seeing this is as the different types of activities that tend to happen in cities being allocated regions such that most residences are covered by facilities of all activity types. This is ensured by initial designs, but maintained as cities expand. This is all done algorithmically, of course, with machine learning models that adapt as data is gathered on where people tend to go and spend money.

This controlled evolution approach is not flawless, but it ensures that 1) the population is not concentrated on any specific set of locations; 2) access to basic facilities like schools, hospitals and markets is guaranteed; 3) every region is roughly equally economically invested in; and, as a result of the previous three, 4) the transport network avoids congestion. Controlling quality standards for residences (as described in other sections) and investing roughly evenly on business & commerce in every region tends to help limit economic and social disparity.

An Example of an Urban Plan

To illustrate the approach to urban planning and evolution, consider the following simple example. The initial city plan, which includes a transport network, delimitation of urban areas, and an outline of regions of expansion, rests between a mountain and a lake. Different line colors and thicknesses indicate the traffic capacities of transport lanes, with red ones being major avenues. The colors of the dots represent the types of facilities that dominate a certain urban area. Blue dots correspond to residences, red to healthcare centers, yellow to schools, orange to universities or research institutions, green to parks, pink to commercial centers (stores, markets, restaurants & bars, shopping malls, sports stadiums, etc.), purple to businesses (offices, factories, etc.), and black to emergency service stations. Other miscellaneous facilities may be accounted for too (e.g, places of worship). The frequency of occurrence of facilities vary by their type; residences are widespread, emergency service stations are rare, but strategically located, and everything else lies somewhere in between those two in terms of frequency per area. Plans are developed algorithmically to suit a much larger variety of activities than this example, in larger cities, for any underlying environment.



Example of strategic urban development

Summary

In summary, the urban development process happens over a long time scale (decades) and is controlled so that certain challenges that emerge as a result of chaotic development are avoided. This process begins with a thorough consideration of the nation's strategic development plan to define what future expansion efforts should be, and what they should achieve. Next, a plan for the chosen expansion strategy is designed - a new city takes form. Then, to move the plan from paper to the real world, economic and social support needs to be gathered. Having successfully gotten people on board, the groundwork for the new city is established over a schedule of construction cycles. Finally, as people move into the new city and it grows and develops, a fair distribution of facilities that support basic needs, and evenly stimulate economies is maintained. This tremendous effort allows cities to be fully developed in a matter of decades (rather than evolve chaotically over centuries), with every city being varied, having national importance, maintaining high life quality standards, being built to scale, and ultimately, enabling a true meritocracy.

Economics

The Financial System

Money is the fuel of society. In Technoland, there is a single currency in use that is a digital token, and there are no financial institutions. There is simply a system that supports transactions and many kinds of financial instruments and markets. The system is decentralized, scalable, and secure, making use of cities' ICT infrastructures and citizens' trusted personal computing devices. Therefore, it is highly available and fault-tolerant. The system supports simple transfers, conditional transfers (based on business logic encoded by smart contracts), lending/borrowing, staking, and investing. A fair and efficient distributed consensus protocol ensures the ledger is consistent, and prevents double-spending or the validation of fraudulent transactions. The use of unregulated tokens (underground chains) is strictly illegal. The system's architecture is based upon tried and tested blockchain technologies, and its operation is tax-funded. There exists a single, extensible portal through which people can manage their finances, interacting with the APIs of the public system.

Tecnholand's financial system has many of the desired properties of blockchains including transparency, immutability, scalability, and availability. Smart contracts extend the decentralized system from a simple transactional ledger to a distributed virtual machine for economically active decentralized applications, with state being reliably updated by the consensus protocol. Different approved chains can be used for different purposes and markets, but all use the same token and are bridged together by the same decentralized platform, ensuring interoperability, and enabling regulation.

The protocol implementation, corpus of standards, and papers describing the mathematical foundation of the operation of the system are open-source, that is, open for anyone to scrutinize and contribute to. Thus, Technoland's financial system is incredibly complex, but decentralized, transparent, fast, secure, and open for anyone to use and improve upon.

Companies & Labor

If money is the fuel of society, companies are its engine, and the workforce is its driver. In Technoland's post-scarcity economy, established companies in the public and private sector provide for human necessities (infrastructure, staple goods), making heavy use of automated systems, while start-ups develop disruptive technologies and services, with varying degrees of success and adoption. For as long as essential companies can provide, the rest of the economic landscape can thrive, and ultimately enable further economic growth through scientific and engineering innovation.

Corporate finance management systems must be integrated into the public financial system, making all of it transparent to the people. There exists a standard, extensible portal for managing finances all companies should use. Company financial officers can set up and manage internal funds transfer networks using smart contracts, effectively programming corporate treasuries to obey a set of business rules, some of which are required by law to be implemented (e.g, automatic payroll). This transparency makes transactions easily traceable for regulatory agencies and volunteer regulators, forcing companies to use money responsibly and preventing many financial crimes.

Companies are organized in many forms, making use of ICT systems that reflect the organizational structure, controlling access to resources and the flow of information depending on the nature of the business they carry out. Many are hierarchical, that is, organized into a tree structure, with a root (the CEO), and branches representing teams, products, or divisions. Some are group-based, with groups working in isolation while coordinating by passing messages between leaders. Others are matrix-based, that is, organized along two dimensions, the division and the business sector, with teams working at particular intersections of the two, reporting to managers of the column or row they find themselves in. Worker autonomy varies within each organization.

Decentralized autonomous organizations (DAO) are significant economic drivers too, responsible for providing important autonomous services and software platforms that are run by users of the service and volunteers, operating without offices or strict leadership hierarchies. The business rules of DAOs are encoded as smart contracts, stored on a blockchain along with transaction history, connected to the financial system. By removing delegated power from directors and placing it directly in the hands of people who use the services, DAOs remove the ability of fund managers to misdirect and waste investor funds, while making services cheaper.

Business products may be physical or digital, and are sold to people or other businesses. Important business tools include office, teleconferencing, management, media manipulation, software development, and design/modeling applications.

With opportunities for labor significantly limited due to automation, Technoland has become a society of mostly specialized professionals, that is, people with jobs that demand uniquely human capabilities, such as analytical and critical thinking, complex problem-solving, leadership, and social influence. All professions require extensive knowledge and use of technology. Operation managers, engineers, researchers, and public servants are among the most common professions, as artificial intelligence (AI) and robotic systems are sufficiently capable of executing many repetitive tasks in many sectors - too many to list here - that don't require inherently human attributes. Work in advancing technological progress or establishing/continuing complex operations are, in general, what most people are paid to do. Technoland's public education system is designed to support this particular kind of job market, and there exists a single online public platform for connecting employers to employees, simply.

A general list of tasks most heavily impacted by automation in Technoland include:

Manual tasks	Business tasks	Engineering tasks	Creative tasks
• material extraction • cargo transport • manufacture • construction • maintenance • serving consumers	• financial accounting • logistic management • marketing & sales • customer management • technical support • legal support • human resourcing	• engineering ○ civil ○ industrial ○ mechanical ○ electrical ○ chemical ○ computer • architecting • testing/auditing	• writing • painting, sculpting, animating • producing audio, composing music • graphic design

Many tasks in the public sector have been automated too. This includes tasks in the bodies of government (legislative, executive, and judicial bodies), public duties of members of learned societies (law making, executive oversight, judgment, etc.), and public services (education, healthcare, infrastructure maintenance, emergency service). So too does automation affect industrial and academic research, which advances at a fast pace thanks to machine learning models and quantum computers.

In general, because of heavily automated industries, reaching satisfactory results requires relatively little human effort. No matter what line of work one finds themself in, their workload is significantly reduced in comparison to the same job in other countries; people generally have to work much less to make a living, especially with a universal basic income. Six hour work days or four day work weeks are commonplace. Due to such great conditions across the board, labor unions are exceedingly rare.

Industries

Technoland is a highly industrialized and economically independent nation. It benefits from diverse and valuable industries as its major economic driving forces, providing economic growth, and technologies that improve people's well-being. A highly skilled and specialized workforce, and reliable ICT infrastructure and systems enable primary, secondary, and tertiary industries to have as much control over their operations on national territory as possible. This approach minimizes the economic risk of factors the government has little control over, strengthens the national economy, and protects Technoland from worldwide crises. The heavy automation of jobs and vertical logistic optimizations in supply chains, due to the integration with advanced open information systems, allow for product prices to be kept under control, and for human workers at every stage on a supply chain to be respectably paid.

Companies in Technoland extract resources from as many naturally occurring sources as possible, and rely on other nations for materials they cannot explore on national territory, but control and regulate the extraction of these resources just as they would in Technoland, implementing the same regulations, where possible, even if this requires significant investment. All further stages in supply chains typically occur in Technoland, given the diverse collection of factories companies have set up. This includes processing, assembly, packaging, and distribution stages. Other processing plants are continuously built as new classes of products demand new assembly lines. With increased industrial activity happening nationally, external risk factors are reduced and the nation's information systems can be used for quickly resolving logistic issues.

Certain key industries, including industrial equipment, machinery, transportation, packaging, and chemical industries, are enablers of virtually every domestic supply chain, and so are heavily invested in by the government. Each processing plant is a long-term investment in the economy, and so must be highly efficient and sustainable. The main industries ordinary people feel a presence of on their day-to-day include the household & personal products industry, the food industry, along with the consumer services and media & entertainment sectors.

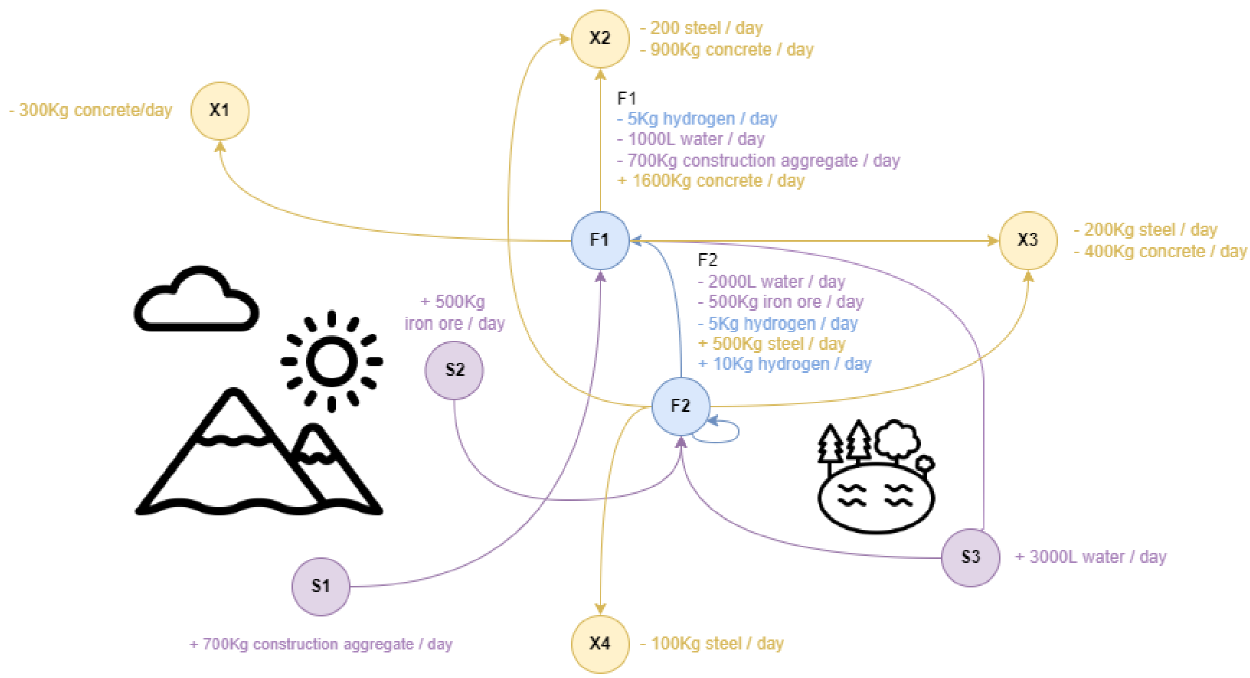
A large-scale cross-industry scientific and engineering effort, that consists of many working groups, continuously works to address each sector's staggering operational, economic, environmental and social challenges. Some of these challenges include process optimization, budget allocation, pollutant emission and water use, and worker treatment standards. Work in this area never ends. In the following sections, we will describe, at a high level, the operation of supply chains in general, then focus on key enabling industries, and the public-oriented industries of Technoland, in detail.

Supply Chains

Supply chains in Technoland are characterized by a high level of transparency and robust supporting information systems. There exists a logistics platform through which companies have access to real-time high-level production and product requirement details of all companies operating at all levels of supply chains, including producers, distributors, and retailers. It is easy to see businesses' plant throughputs, as well as product requirements, product stocks, and sale prices for most products leaving each assembly line. Dashboards and geographic views of this information simplify people's understanding of the operation of businesses, and incentivize business collaboration. This level of transparency greatly simplifies external auditing and quality assurance processes. The platform also allows for a global analysis of all operations to be made, enabling process optimizations (in product sourcing, production, transport, etc.) that could otherwise not have been discovered. Any company with supply chains in Technoland must use the platform.

With all this information on operations available, companies and the government can collaborate in planning for long-term national economic development goals. Factories can be thought of as functions with multiple inputs and multiple outputs, transforming input materials or products into new products to be delivered to other factories or distributors. The geographic arrangement of factories and transport lines has a major impact on the performance of the collection of supply chains as a whole. With known locations of sources of raw materials, and supply chain endpoints (i.e, cities, markets, construction sites) that need to receive a stable amount of products periodically, it is possible to find optimal placements of factories over the geography of Technoland. What we seek to find are the placements that satisfy endpoint product requirements, minimizing the number of factories and total cost of cargo transported in the network, using existing or new transport lines, subject to the constraints set by the geography (physical barriers, air & terrain properties, existing ecosystems, etc.)

To illustrate the approach to strategic factory placement and collaboration, consider the following simple example, represented as a directed graph. We have three naturally occurring resources near a lake and a mountain: water, iron ore, and a mix of rocks for construction aggregate, including sand, gravel, and limestone. We also have a set of cities that need steel and/or concrete for construction. Then we have two factories: one which produces steel and hydrogen (for direct reduction), and the other concrete. Edges represent the flow of resources from a node to another, (+) indicating a resource flows *from* a node, and (-) indicating a resource flows *to* it. The network shows two factories, one of which sends resources to another, located at the center of the sources and cities, minimizing overall cargo transport costs.



Example of strategic factory placement and collaboration

With complete knowledge about the underlying geography, transport networks, and existing factories, a software program can find an arrangement of factories and resource flows so that the network of all supply chains stays optimal. This assists businesses in procuring resources for their operations (announcing their requirements), and establishing new factories to drive up supply. It also allows long-term projections of the evolution of supply chains to be simulated, which can be used in economic development models. Furthermore, the granularity of publicly available information, along with intuitive graphical representations (geographic and logical views) of the evolving full supply chain network enhances people's understanding of the operation of the society they live in, helping them appreciate its complexity. All this is only made possible because companies must interface with the same logistics platform.

In the early days of Technoland, as the first city was being developed, an initial set of supply chains of key industries was planned and implemented, following the principles described here: minimizing the number of factories and transport costs, and maximizing the sharing of resources, based on a pledge of purchase of resources by companies developing the infrastructure. This provided for an initial set of construction, industrial machinery, and civilian products to be produced. This initial set of supply chains was particularly important as it needed to remain operational in the long term to be cost-effective, and enable as many consumer-oriented industries as possible. As the network of supply chains evolved, a cycle of increased supply driving demand, and demand driving supply was established, which continues slowly to this day.

Supply chain flexibility is an important aspect of business companies need to consider to become competitive market participants. For stable industries, such as the key enabling industries, the described scheme works fine as businesses tend to have long-term stable product requirements; factories' initial placements remain optimal in the long term. Businesses in unstable markets, that is, operating on volatile product requirements, need more flexibility if they want to keep their operations optimal. They can achieve this flexibility by various means, such as deploying mobile (container-like) processing plants in mass, assemblable/disassemblable machinery, or by buying 3D printers for specific product types. These options allow companies to flexibly scale production and move operations to reduce transport costs.

Another important aspect of the network of supply chains is its fault-tolerance. Preventing an industry collapse requires a level of redundancy to be in place, that is, additional transport connections between any two nodes on a chain, and varied processing plants supplying the same product through different processes. It is crucial that companies have many options for sourcing products, and are (fiscally) incentivized to invest in new facilities to reduce single points of failure in an industry, and meet increasing demand. Increasing redundancy is a costly process, but one that minimizes risks that could lead to much greater economic consequences. Technoland's supply chain network includes several redundant nodes and connections, especially so in the key enabling industries.

Several supporting systems are in place along the supply chains, in addition to the public logistics system. Supervisory control and data acquisition (SCADA) systems support processing facilities in monitoring the operation of industrial equipment. A broad set of quality assurance tools and product standards help companies comply with internal and external regulations. Modeling tools allow managers to create and monitor facility operations in real-time through digital twins. Analytics and reporting tools facilitate factory operation optimizations. Real-time product tracking systems are integrated into the public logistics platform. There are many more systems in place.

Blockchain technologies with smart contract capabilities are used extensively over the supply chain network, to automatically enforce business logic, making several aspects of business in industry more secure and reliable. Smart contracts are programs stored on a blockchain that trigger certain actions whenever a condition is met. They interface with the world via inbound oracles (agents that call a contract's execution) or outbound oracles (agents that trigger a desired action when execution succeeds). Agents can be hardware, such as sensors, software, such as other programs, or humans, such as logistics managers. Three compulsory applications of smart contracts in supply chains include:

- Logging production line output.
- Logging events for product monitoring, including its dispatch, receivement, and package integrity over the course of transit.
- Releasing payment upon a product's receivement and validation by the buyer, using additional hardware oracles for certifying a product's delivery location.

These three fundamental use cases must be implemented in the equipment and machinery of all production processes, as well as in transport vehicles and packages, in a tamperproof way, to ensure accurate monitoring by the public logistics platform. Subverting their use is a violation of the law.

Product storage and distribution in Technoland is achieved through automated warehouses and distribution centers in strategic locations, often within cities. Products need to be stored temporarily before being delivered to retail shops or to consumers, so companies have better control over the release of their products onto the market. Some companies invest in their own automated warehouses, as their business grows to accommodate entire buildings. Other companies dynamically rent warehouse space from other storage companies that operate large warehouses, storing and dispatching products for multiple companies under the same roof up to some maximum capacity. This approach to shared warehousing allows smaller companies to start business with smaller storage investments, and makes it easy for them to move inventory closer to where their customers need it. Automated warehouses can be thought of as swarms of highly coordinated robots, placing and moving thousands of packages around a three dimensional grid, and delivering them to outbound ports, to be autonomously transported in the last mile to retail shop docks (by trucks) or directly to e-customers (by drones) in residential buildings or public spaces. There exists a public user interface for purchasing wholesale and retail products directly from the logistics platform.

Having illustrated a global picture of the supply chain landscape in Technoland, we now turn our attention to the specific industries and sectors of its economy, starting with the key enabling industries, then on to consumer-oriented industries. Recall that, in general, there are three major distinctions between Technoland's industries and other countries: an emphasis on domestic supply chains, logistic system transparency, and the widespread adoption of environmentally sustainable processes, including the use of green & nuclear energy, low pollutant emissions, and highly efficient water use. Several cross-industry working groups in institutes of industrial research continuously tackle the technical challenges of industries to help improve their operations and ensure they operate sustainably. In the interest of brevity, we will keep the discussion of each specific industry concise, but much, much more could be said about them all.

A Taxonomy of Industries

Enabling Industries

Natural Resource Extraction

- Mining
- Forestry
- Agriculture

Chemicals and Materials

- Polymers
- Specialty chemicals
- Consumer compunds

Industrial Equipment and Machinery

- Equipment
- Machine parts
- Machinery

Industrial Transportation

- Cargo ships
- Cargo trains and trucks
- Cargo drones

Packaging

Construction

- Materials
- Vehicles
- Service

ICT

- Computers
- Telecom
- Service

Business Services Sector

Consumer-Oriented Industries

Household & Personal Products

- Furniture
- Appliances
  - Small
  - Major
- Consumer Electronics
- Clothing & Footwear
- Other products
  - Kitchen
  - Bathroom
  - Gardening
  - Stationery
  - ...

Food

- Food technologies
  - Harvesting
  - Food processing
- Produce
  - Fruits
  - Vegetables
- Animal farming
  - Proteins
  - Dairy

Media & Entertainment

- Media production equipment
- Physical media
- Digital media
- Real-life Entertainment
  - Exhibitions
  - Live events

Pharmaceutical

Consumer Services Sector

The Enabling Industries

Natural Resource Extraction:

The primary sector of Technoland's economy is largely automated as the extraction of natural resources, from national or foreign territories, is carried out by advanced heavy machinery with complex computer vision systems & mechanical components. Their main activities are the extraction of rocks and ores, wood, and agricultural products. Some of these machines include drills, excavators, loaders, bulldozers, graders, trucks, feller bunchers, and tractors. In quarries/mines, the geology is loosened through controlled explosions, then excavators continuously extract rocks and ores, delivering this mass to surge loaders that reliably load trucks, which in turn carry it to smelting and distribution facilities. Feller bunchers cut down trees, leaving them to another machine to prune the branches and leaves from logs, which are picked up by trucks that deliver them to lumber mills where they are transformed into useful wood. Sites are reforested. Agricultural tractors plant, nurture, and harvest crops, both for the food industry, and for other industries that need agricultural products (i.e, fibers, fuels, and raw materials such as ethanol or carbon fiber). A significant part of agriculture also occurs in large-scale autonomous hydroponic facilities. The transport of high volumes of raw materials typically occur over proprietary vactrain lines from the extraction site.

Technoland's waste management infrastructure provides companies with an alternative source for many primary resources: trash. Much is effectively recycled and finds its way back into supply chains. Recycled resources are transported from facilities to large depots, then sold wholesale to companies, which have fiscal incentives to participate in the circular economy. The recycling industry is considered to be as critical a component of Technoland's primary sector as all the others.

Chemical & Materials Industry:

Chemical manufacturing is based on industrial processes that use energy to combine raw materials through several chemical reactions inside reactor tanks, in order to move, reconfigure, and manage molecules to produce chemical compounds. The result of a reaction flows from vessels through systems of pipes and other reactors which separate the desired substances from undesired ones. The substances are then distilled, purified, and/or concentrated by further chemical processes, then moved to storage tanks of varying sizes and properties, depending on the substance. SCADA systems in chemical plants manage pipes, pumps, compressors, and all equipment designed to control the heat, pressure, and flow of substances for the chemistry taking place at factories. A variety of safety features are incorporated into the equipment and storage tanks to automatically prevent accidents from happening.

Technoland's chemical industry is characterized by the ubiquitous adoption of carbon neutral or negative processes, achieved through the electrification of chemical reactions and carbon capture. This means electricity, rather than fossil fuels, is used for heating and cooling, controlling the pressure, and flow of substances. Greenhouse gasses are generally not used or emitted, with chemical reactions being provoked through processes that dismiss their need. Recyclable materials that are produced sustainably are preferred across several industries thanks to economic incentives. Indefinitely recyclable polymers, that achieve all the desirable properties of traditional plastic, but are cheaper to produce and can naturally decompose are used ubiquitously across industries. In partnership with the government, companies continuously invest in research for optimizing processes, discovering better materials, and developing infrastructure for purifying collected trash for recycling.

Industrial Equipment & Machinery:
The industry of industrial equipment and machinery provides other industries with the instruments to make products at scale. Equipment includes things like hammers, screwdrivers, wrenches, ratchets, pliers, etc. Important machine parts include screws, nuts and bolts, gears, sprockets, chains, springs, hinges, and ball bearings. Machinery can be classified on four axes: their means of mechanization (electrical, hydraulic, pneumatic), scale (light/heavy), the type of material they process (metals, polymers, glass, wood, etc.), and the industry they are oriented toward. Some of the products of this industry include conveyor belts, pipes, tanks, presses, robotic arms, lasers, cutting/molding machines, cranes, lathes, furnaces, solderers, sprayers, packagers, and 3D printers, which can be used in any other industry's manufacture and assembly processes. These come equipped with sensors and programmable logic controllers that can securely interface with SCADA systems via standardized protocols, allowing for their granular control and data gathering for performance measurement & analytics.

Assembly lines are largely dominated by cartesian and articulated robots, either in place, or moving around the structures (floors, walls, ceiling) of facilities. Two particularly important machines are the overhead cranes and robotic arms, which, in unison with conveyor belts, are capable of assembling any imaginable product as long as its parts are readily available, allowing some assembly lines to be repurposed or adapted over time for multiple products. Modern general-purpose assembly robots can learn from humans, gathering data on a given step of a process by observing the human's actions, then imitating them, and later optimizing them. Technoland's most efficient factories are best described as symphonies of mechanical robots, chemical processes, and a few helping human hands here and there.

Industrial Transportation:

The industry of industrial transport vehicles in Technoland encompases companies and supply chains related to the production of freight-carrying transportation machines, including trucks, ships, vactrains, and drones. These vehicles tend to be powered by highly efficient electric or hydrogen-combustion engines. They are large and made from ruggedized materials. They are autonomous and invariably integrated into the public logistics system, enabling a ubiquitous real-time service for tracking products in transit. Supply chains typically make use of many, if not all vehicle categories, for example, trucks may carry iron ores to a vactrain terminal, which takes it to a smelting facility, from where it may be shipped to a steel factory and transformed into an appliance, packaged there, then delivered in bulk to a distribution center by a large drone.

The manufacturing process of each industrial transport vehicle within a category is unique, but a few common steps include the stamping, molding, cutting, soldering, and chemical conditioning of the vehicle frames, the assembly of motors, batteries, wheels/propellers, mechanical parts, and digital control systems, including chips, sensors, network cards, and electrical wiring. Industrial transport vehicles are designed to maximize durability, energy efficiency, and freight carrying capacity; this is reflected in every aspect of their design. This industry also helps develop the supporting infrastructure for vehicles (e.g, roads, docks, vactrain tubes & terminals, and hangars).

Packaging:

Technoland has a packages industry, that is a set of supply chains that supply factories in other industries with packages they can distribute their products in. Many kinds of products in most consumer-oriented industries come in standardized forms, so companies buy and customize pre built packages for their needs, rather than building their own package manufacturing processes for their own product lines, allowing their products to be much cheaper. This standardization also allows for improvements in packaging to be reflected across an entire industry as a package's quality or manufacturing process is improved. Standardization also facilitates regulation.

The long-term goals of research in this industry is to develop smarter and more sustainable packaging. One way sustainability is achieved is through package reuse, as companies in the packages industry invest in campaigns and infrastructure for collecting used packages and adapting them to new products to avoid the recycling and manufacturing steps. Disposable packages tend to be made from recyclable or biodegradable materials, to help enable a circular economy and prevent accumulation of waste. Packages can be made smarter by being equipped with sensors for tracking or monitoring the content they carry, serving as hardware oracles to smart contracts.

Construction Industry:

Technoland's construction industry is responsible for developing infrastructure through contracts with other companies. To this end, it is subdivided into the industries of construction vehicle manufacturing, material production, and the construction service.

Common autonomous construction vehicles include cement mixers, excavators, drills, backhoes, bulldozers, loaders, tractors, fork lifts, scissor and articulated lifts, dump trucks, rollers, pavers, and cranes. As in other vehicle types, the common steps in the manufacturing process of heavy vehicles include the stamping, molding, cutting, soldering, and chemical conditioning of the vehicle frames and chassis, and the assembly of motors, batteries, mechanical parts (e.g, wheels, arms), and digital control systems. Construction vehicles are designed to be durable and minimize stress when performing certain mechanical motions; this is reflected on all aspects of their design. 3D printing construction vehicles play a vital role in the construction process too.

By far, the two most important construction materials are steel and concrete, which are ubiquitously produced by fossil-free processes, typically using hydrogen as a fuel for the heating stages in production. Steel beams and other metallic support structures provide a backbone upon which concrete is molded, giving buildings their resiliency. Other important materials are ones used for electrical wiring (copper cables), water and sewage piping (PVC), and for telecommunications (optical fiber). Another set of materials are needed for surface finishings (e.g, plaster, wood, paint), and building openings (e.g, metals and glass for doors, windows).

Construction projects and companies can be extremely varied, serving clients in both the public and private sectors. Public infrastructure projects include distributed utilities infrastructures, which involves the construction of plants and grids for energy, water, and waste management, the road infrastructure, which serves as the backbone of the transport system, public spaces, and public offices or public service buildings. Private infrastructure projects include a wide variety of buildings, such as residences, offices, and commercial centers. All other industries also require significant supporting infrastructure for their supply chains (i.e, factories, warehouses).

A construction project is typically carried out in five phases. In the conception, design, and planning phase, the initial ideas for the form and function of the project are formally described in a proposal. Next, project permits need to be acquired, that is, it must be approved by government agencies through a common streamlined platform that ensures the project aligns with all regulatory and urban development requirements. In the pre-construction phase, a project plan is thoroughly specified along with cost estimates. Materials and labor are procured in the next phase, using the public logistics platform, and then construction takes off in a coordinated, heavily automated process.

Information & Communication Technology Sector:
Technoland's ICT sector comprises industries responsible for developing the nation's ICT infrastructure, as described in other sections. The two primary sub-sectors in this context are the computer sector, and the telecommunications sector. Both of these sectors sell products and services to other industries, and directly to consumers, thus, they include both enabling and consumer-oriented industries.

The computer sector includes the computer hardware & peripherals industry (which includes the semiconductor industry), and the software & services industry. Broadly, the industries of this sub-sector are responsible for developing the industrial processes and supply chains related to the production of computers, including the manufacture of integrated circuits, memory, storage mediums, network interface cards, peripheral devices, circuit boards, and encasings, as well as the operating systems, application programs, and distributed system middleware running on the hardware.

The landscape of computer platforms is diverse, but a few of them have risen to prominence and have been broadly adopted by industries and consumers, allowing developers to target a small number of platforms. The classes of computers include embedded systems, general-purpose desktop/laptop/mobile/wearable/VR/AR devices, workstations, servers, mainframes, supercomputers, and quantum computers, each having an associated (small) domain of computer architectures and operating systems. There exist popular native and cross-platform software development frameworks.

The telecommunications sector includes the industry of networking equipment (e.g, routers, switches, firewalls), communication mediums (e.g, cable, cellular, satellite) and protocols for the Internet or local enterprise/household/personal area networks. The industries of this sub-sector develop the infrastructure for data transmission, monitor & optimize it for the traffic's characteristics with content distribution networks (CDNs), integrate it with the fundamental distributed applications of society (i.e, government, economic systems), and implement security mechanisms to abate the spread of malware and denial of service (DoS) attacks.

There exist common public open platforms for most essential online services, including web search, e-commerce for physical and digital products, social media and news, personal data storage, content sharing, and a multimedia experience platform, all running in residential building's data centers and the public decentralized ICT infra. These platforms do not sell personally identifiable information of their users to third parties. The software and hardware infrastructure is managed by government agencies and regulated DAOs. Being free, open, and decentralized, these subsidized services unburden tech companies from having to provide them, allowing them to focus their efforts on other cutting-edge technologies for industry, business, and consumers.

Business Services Sector:

The business services sector consists of industries that provide support services for various aspects of other businesses, to help them achieve success. The main service in this context is consulting, which includes strategy, operational, financial, IT, HR, PR, marketing, legal, compliance, and sustainability consultancy, among several others. Consulting firms provide companies with solutions to their business challenges in the listed areas, giving informed advice, helping in planning, and implementing systems. They hire generalists, subject-matter experts, and use/develop/sell artificial intelligence agents trained on data from the history of company behaviors and metrics.

Robots can fulfill many complex consultancy tasks in the listed areas, including making strategic decisions, finding operation optimizations, implementing information systems and applications, finding staff, procuring resources, using media channels to promote the brand, giving legal advice (for solving disputes, complying with regulations etc.) and much more. These learned models can be used independently or integrated into a single business brain platform, integrating with several fundamental distributed applications of society, (e.g, the financial, logistic, legal/judiciary/executive systems, media platforms). Some solutions are open-source, helping businesses enormously.

The Consumer-Oriented Industries

Household & Personal Products Sector:

The household & personal products sector is one of Technoland's most diverse and rapidly evolving as it encompasses companies involved in the manufacturing process of furniture, appliances, home utensils & accessories, tools, clothing, and much more. The long-term development goals of this industry are the development of reliable and durable smart home & personal equipment that can intelligently adapt to improve their users' experience, communicating securely in the Internet of Things.

The furniture manufacturing industry produces a broad variety of home products for sitting (chairs, sofas), setting things (tables, desks, workbenches), lying (beds), storing things (shelves, closets, chests), illuminating (lights, lamps), and decorating. Materials for these products include metals, polymers, glass, wood, rubber, and more. Typical steps in furniture manufacturing include cutting and molding parts, preparing, joining, polishing them, and applying finishes and upholstery.

The household appliances market includes products of three general categories: small appliances, major appliances, and consumer electronics. Small appliances are portable and do things like process food, acclimatize a room, or clean the house. Major appliances are non-portable and aid in cooking, washing laundry, or preserving food. Consumer electronics include computers, smartphones, displays, projectors, audio systems, headphones, cameras, wearable tech, and VR/AR headsets.

There are many other industries in this sector that deserve mention, such as the that of kitchen utensils & bathroom accessories, house & gardening tools, stationery, textiles & clothing, footwear, bags/backpacks/baggages, musical instruments, toys, pet products, sports equipment, light transport units (bikes, scooters), and many more.

A typical smart home in Technoland is one that unburdens residents from most common household tasks, and provides a high level of comfort automatically. House cleaning robots scour the floors and walls of apartments, having complete knowledge of their topologies. Several machines help prepare food by cutting, squeezing, mixing, peeling, and smashing various types of ingredients. Smart fridges monitor their own contents and suggest purchases for certain recipes which can be ordered immediately. Laundry baskets are connected to washing and drying machines, which sort, fold, and iron clothing too. Toilets clean themselves. Baths can be remotely prepared in advance. Shelves monitor the presence/absence of important items such as hygiene/medical products. Closets sort clothes and suggest outfits for each day. Internal atmospheric conditions and lighting are regulated based on the weather. Dashboards give residents high control over utilities usage. Biometric scanners control access to homes. Personal voice assistants provide a standard interface to all of these household systems.

Food Industry:

Technoland's food industry is one of its most important. It can be best described as a set of infrastructures that 1) grow; 2) process; 3) package, and 4) distribute food items, which can be classified into five groups: fruits, vegetables, grains, proteins, and dairy. In a healthy diet, vegetables and grains should make up most of one's consumption, followed by fruits and proteins, and then dairy. Food item supply chains in Technoland differ from other industries' because its first step (growing food) occurs in mass scale both in urban hydroponic plant factories, as well as in crop fields far off from cities.

Technoland's food industry strives to achieve a number of fundamental goals. A high proportion of natural land should be preserved, and use of land should not leave it less fertile. Technological development in the industry should not cause ecological and environmental damage. Supply chains should be disentangled and fault-tolerant, and transport costs should be minimized, that is, food should always be moving closer to its final point of consumption. Food waste should be minimized. Companies should be able to cooperate easily to produce new food products. Manual labor should be minimized. Finally, the nation should be as self-sufficient as possible.

The key to an effective food industry is the investment on food science, which leads to the development of food technologies, which in turn lead to improvements in food processing, preservation, and industrial quality control. Food science incorporates multiple scientific disciplines, including chemistry, physics, biology, and computing. This realm of research concerns itself with the development of new food products, production processes, food testing, packaging, and consumer satisfaction studies, as well as analyzing socioeconomic, ecological, and environmental phenomena that arise.

Produce supply chains, which include most crops, are fairly straightforward: much of it is grown within cities in tall urban hydroponic farms - either in specially built facilities or in residential buildings - while another part is harvested in fertile fields, and whatever else cannot be grown in national territory is imported from foreign nations. Produce production is dependent on a number of other manufacturing processes, including agricultural machinery (e.g, tractors, drones), agrochemicals, and fertilizers. Many apartments include hydroponic gardens, letting residents plant their own food.

Animal farming, which includes livestock, poultry, and fish production, is limited due to the realization that the population is more efficiently & healthily fed by dedicating produce to human consumption rather than for animals, among many other reasons. The limitation is imposed by law and is based on population sizes. Non-red meat production is economically incentivized due to their lessened environmental impact. Synthetic meat production is widespread and cheap. Traditional carveries are illegal. As a result, animal welfare and public health is high, while the environmental impact is low.

Figure it out…
Healthy food is medicine
Deep dive into automated vertical hydroponic farms
All benefits of mass-scale urban hydroponic agriculture

Approval - Food regulation agency

Pharmaceutical Industry:
Affordable medication is a human right.

Approval - Drug regulation agency - incorruptible

Media & Entertainment Sectors:

Entertainment has always been an important part of life, and a catalyst for tremendous human effort and economic activity. Mass production and distribution of digital media, along with different forms of exhibition and live entertainment are major undertakings, involving a highly diverse set of technical and creative skills, focused on the creation of activities and experiences that captivate audiences, giving them pleasure and delight, setting their imaginations ablaze, or provoking poignant reflection.

Modern media production tools include word processors, audio recording and mixing equipment (e.g, microphones, mixing consoles), video recording equipment (e.g, cameras, drones), video editing software, computer graphics game engines, and digital signal & media processors. The set of industries oriented to the development of these tools are the enabling industries of the media & entertainment sectors.

Digital media comes in many forms and are digitally transferred to buyers or subscribers via content distribution networks (including residential servers) from open and decentralized multimedia experience platforms. Different types of media include books and audiobooks, podcasts, music, video, movies and television shows/series, computer games, web and mobile content, and VR/AR experiences.

Modern media development paradigms greatly facilitate the production process. With an abundance of human-made creative content, trained AI models are capable of partially or fully automating creative and technical tasks, such as writing story scripts, storyboarding, animating, and producing sound and music. Procedurally generated stories, music, video, games, and VR experiences are common forms of entertainment; there exist platforms where users describe the type of experience they want, and it is produced and personalized for them at that moment. Technology enabling the recording and subsequent transmission of authentic real-life (exciting) experiences has given rise to a type of job that is the immersive experience VR recorder, though policies limit the type of content that can be recorded, for public safety.

Real-life entertainment comes in two forms: exhibition and live entertainment. Exhibition entertainment includes museums, art exhibits, fairs, festivals, trade shows, conventions, amusement parks, and so on. The production of exhibition entertainment involves tasks such as aggregating the exhibition content, buying or renting the space, preparing infrastructure, and advertising the event through communication channels. Live entertainment includes concerts, nightclubs, myriad live performances (such as sports, theater, comedy, orchestra/opera, magic, circus, fashion), parades, and so on. Many of the tasks of exhibition entertainment apply to live entertainment too, but many event-specific preparations need to be made as they vary wildly between each one. There exist public event planning & advertising platforms, integrated with social media.

Consumer Services Sector:

Due to Technoland's strong public sector, highly automated infrastructures, and broad set of open decentralized online services, the consumer services sector of Technoland is somewhat limited, but still a significant economic driver. The main services include leisure services (e.g, tourism & hospitality, leisure facilities (salons, spas, getaways)), food services (e.g, restaurants), event planning and execution (e.g, parties, weddings), media subscription services, delivery services, furnishing/personal relocation services, and others. Unsurprisingly, many tasks involved in the listed services are automated. Servitized products represent a significant part of the services sector too.

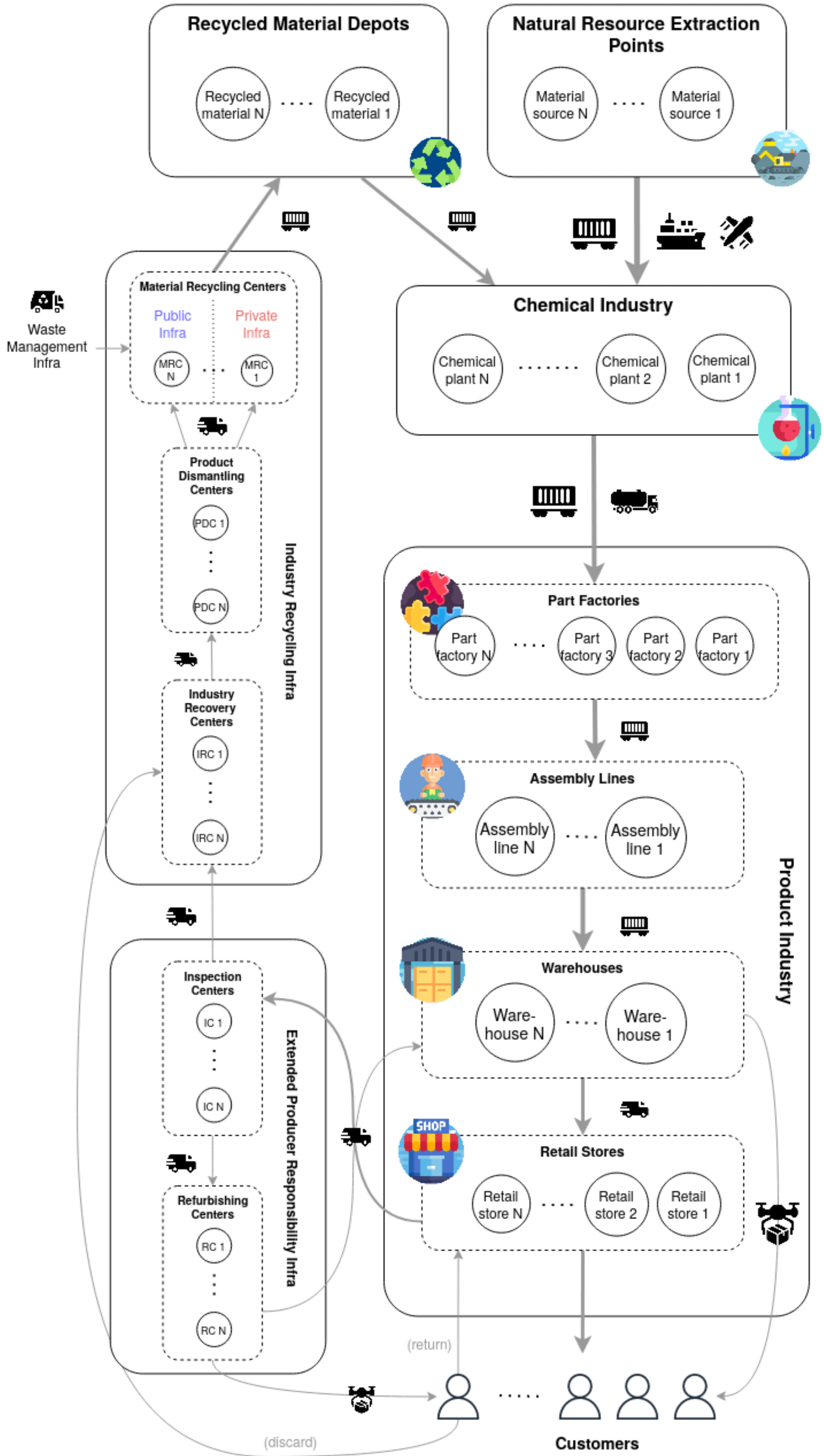
Reverse Logistics & Extended Producer Responsibility

What happens when a product fails to perform its function and it needs to be returned? What happens when a good is disposed of because it has reached the end of its useful lifetime? Companies in Technoland must concern themselves with the logistics of such situations and design products around easy recyclability to comply with regulations, or risk having their operations compromised (i.e manufacturing shut down, products delisted from markets). However, with public recycling infrastructure and shared private infrastructure in place for processing faulty products of popular categories, for any emerging company, tackling these issues becomes a matter of finding and managing relations with the right sustainability companies to help them extend their supply chains beyond end-consumers. In this context, reverse logistics planning and extended producer responsibility represent opportunities for companies to regain value from faulty or obsolete items, and build customer loyalty with a good item return experience. The market price of products always include end-of-life cycle logistics costs, and most products are designed to be easily recyclable with existing infrastructure.

The goal of reverse supply chain management is to establish efficient processes for moving goods up the supply chain to minimize losses related to the return of faulty goods, while avoiding waste. The return of faulty goods can happen at any link in the supply chain, and a different procedure must handle the return. Customers may return faulty products; retailers may return faulty batches; manufacturers may return poor raw materials. As with forward motion of goods, backward motion is monitored by the public logistics platform, with return agreements being codified in smart contracts.

Generally, the return of faulty durable goods occurs in 3 steps: initial processing, inspection, and refurbishing/recycling. First, the return must be delivered back to the seller and a return order must be authorized and logged. Second, returns should be inspected and sorted depending on whether they still have recoverable value. Finally, they are sent on their way to a refurbishing/recycling facility. In the former case, items are partially dismantled, fixed, then sent back to their buyers or to a warehouse. In the latter case, they are sent to a recovery center of their industry, where items of the same category (e.g, home appliances) are delivered to at their end-of-life, then sorted based on their product type (e.g, consumer electronic). Then they are sent to a product dismantling facility, which uses disassembly lines to identify each product model, load their associated disassembly procedure, and break it down to its parts. All parts are sorted based on their constituent materials, and delivered to material recycling centers, some of which may be part of the public waste management infrastructure while others may be private. From there, the materials are transported to public/private recycled material depots, and sold as raw materials, closing the loop of the circular economy.

Generic Sustainable Product Supply Chain



An Example of a Supply Chain

Having considered the important attributes of all major industries in Technoland, let us now bring it all together with an example, let us illustrate the life cycle of a ubiquitous consumer electronic: a modern smartphone, from raw material extraction to recycling. A typical smartphone assembly line combines a number of highly complex device components into a single, beautiful package that abstracts away all the insane engineering that goes into performing seemingly trivial everyday tasks, like sending instant messages or searching the web. Consumers tend to take capabilities such as these for granted, but it is important to understand where these technologies that are indistinguishable from magic come from. Technoland's fundamental education curriculum goes to great lengths to arm citizens with a profound understanding of their most important industries and supply chains.

Establishing the forward & reverse logistics processes for any product is a significant undertaking, requiring tremendous investment and expertise. It begins with the design of the product, using professional computer-aided design (CAD) software. Several prototypes should be created, each version iterating upon the qualities of the previous, until a final version is achieved and becomes ready to be mass-produced. Each component should come from an associated manufacturing process, which can be designed and implemented by the company itself, or outsourced; a decision must be made as to what parts of the process it should be responsible for and what should be contracted. Then the assembly line must be designed, using industrial machinery to precisely put together the individual parts in such a way as to safely and reliably optimize production, maximizing the number of tasks done in parallel, while minimizing the amount of time taken in each task with the available resources. The SCADA system of this manufacturing process should then be designed, as should the procedures for periodically checking the machinery and testing all parts of the product at the end. Having planned the operation end-to-end, companies in the enabling industries must be then contracted to set up natural resource extraction, chemical manufacturing, machinery implementation, cargo transport, and packaging. Finally, the infrastructures and procedures for the reverse logistics processes to handle returned products should be designed & implemented. Evidently, many considerations need to be made in the establishment of a manufacturing process and its supporting procedures, but with the public logistic system already in place, and a complete set of enabling industries available, the initial setup process is greatly simplified.

Let us now delve into the details of the smartphone manufacturing process. The main materials involved include metals (e.g, aluminum, cobalt, lithium, copper, gold), polymers, and silicon, which are sourced and conditioned by various means by the raw materials and chemicals industries. These materials are provided to numerous factories, each being responsible for fabricating a single part of the smartphone.

The brains of the device, the processing units, often combined into a single system-on-a-chip (SoC), as well as the main (DRAM) and secondary (Flash) memory, are produced by the semiconductor industry in a photolithographic process that etches a microarchitecture on chemically conditioned silicon wafers with extreme precision. The printed circuit board is made in a process that etches circuit paths on laminated epoxy-infused fiberglass and copper plates for carrying energy (from the battery) and command signals (from processor pins) to all modules of the device, in an complex multilayer bus network, electrically controlled by capacitors and resistors (that come from their own manufacturing processes). The lithium-ion battery is produced in a process where electrode elements are mixed to produce a lithium slurry, which is then applied to chemically conditioned the copper anode and aluminum cathode sheets, folded into a secure battery encasing, that is pressure-injected with an electrolyte solution to conduct ions, providing a stable energy source for the device.

The chassis and buttons are made of aluminum, a polymer, or glass formed into a precise mold. The capacitive touchscreen is made using glass/sapphire and a display technology (e.g, liquid crystal, light-emitting diodes). The biometric scanners use optical and other sensing technologies for detecting unique human characteristics (i.e, fingerprint, face, iris), relying on software for matching a presented template to a recorded template with a degree of confidence. The digital cameras are built from various parts forming an optical system, including a lens, aperture, and image sensor and processor. Lenses are made from a specific type of polished glass, sculpted into a shape that focuses light on the sensor. The aperture is a mechanical part that uses motors to control the size of the light opening. The image sensor converts incoming light into electrical signals, while the processor processes these signals, storing them as a digital photograph - both are made by the semiconductor industry. The sound system includes the microphones and loudspeakers, both made from magnets, copper wires formed into a coil, and a thin polymer diaphragm, assembled such that the coil surrounded by the magnet flexes the diaphragm to produce air pressure waves, or produces a current when air pressure waves hit the diaphragm, codifying digital audio. The cellular, wi-fi, bluetooth, GPS, and NFC internal microstrip antennas are produced similarly to circuit boards. Various sensors (e.g, accelerometer, gyroscope, ambient light/temperature/humidity/pressure) are produced in their own manufacturing process.

The assembly process begins with delivering the components of the phone manufactured by different factories to their respective stations in the assembly line so the machinery has a constant feed of parts, so operations keep running continuously. The first station places the base component - the back cover - on a conveyor belt, upon which all subsequent parts will be fastened (i.e, screwed/glued/soldered) in turn. In parallel, many additional support structures - made from metals, polymers, or rubber - are used to affix together the discrete parts of each internal module, including the battery, printed circuit boards (upon which the SoC, memories, and ports have already been fastened to), biometric scanners, camera system, sound system, antennas, and additional sensors. A global support structure is fastened to the back cover, and each module is fastened to their respective space in the global structure in turn, with each such step being interleaved with an electronic connection step, so parts are iteratively placed and connected to each other. As modules are placed in the global structure, other support parts may be fastened to the global structure to accommodate further modules. Some modules must be placed in sequence, others can be placed in parallel; the design must be made with compactness and manufacturing parallelization in mind.

To give a simple example of this assembly method, consider this procedure:

1) In parallel, the phone modules are fastened to their support structures
2) The base component and initial global support structure are fastened together
3) The camera, sound, and battery modules are fastened to the global structure
4) The circuit board is fastened and connected to the newly placed modules
5) Additional support structures are fastened to the global structure
6) Some of the antennas and sensors are fastened to the global structure
7) The circuit board is connected to the newly placed modules
8) Additional support structures are fastened to the global structure
9) The buttons and biometric scanners are fastened to the global structure
10) The remaining antennas and sensors are fastened to the global structure
11) The circuit board is connected to the newly placed modules
12) Additional support structures are fastened to the global structure
13) The front display is fastened to the global structure and base component

Following the assembly, a number of tests must be run on every device to filter out the defective ones from the rest. Nondestructive hardware tests verify the integrity and durability of the product, by analyzing things like screw tightness, welds/solders, and overall resistance to tension, among other things. Unit tests verify the modules of the device are functioning properly, including the electronic parts, display, cameras, microphones, speakers, antennas, and sensors. Finally, the operating system is tested along with the usual built-in applications.

Following the tests, approved devices are packaged in simple recyclable parcels and delivered by freight transport vehicles (i.e, trains, trucks, ships, airplanes, drones) to warehouses, where they remain until retail stores need to refill their stocks, or a customer orders a phone online and requests it be delivered to their home directly.

The customer registers their identity with the personal device, customizes the operating system preferences (or easily switches to an open-source one), installs their favorite apps, and merrily goes on their way using the device for some time. They do all the normal things one does with a smartphone: send messages, check social media and news, consume media through their subscriptions, etc. That is, until one unfortunate day, the customer determines they will no longer keep using the phone, either because it became faulty, or because they wish to buy a new one.

In the former case (the item became faulty), the customer should deliver the phone to one of the company's retail stores (or recovery centers if the company has no physical store), and initiate a refurbishment order. If the fault was caused due to the customer's misuse (e.g, they dropped it, causing the display to break), they may have to pay for the refurbishment. On the other hand, if the fault was caused by an uncaught manufacturing error (e.g, a defective battery was installed in assembly), the customer may be reimbursed, or have their phone replaced or refurbished at no additional cost. Either way, the phone is delivered to one of the company's refurbishment centers, where it is partially dismantled and refurbished, then delivered back to the customer if they requested it, or to one of the company's warehouses otherwise.

In the latter case (the customer wishes to buy a new phone), the customer may want to sell their phone in a popular used goods market, return it to the seller in exchange for a discount on their next phone, or they might want to recycle it, in which case they should deliver it to a home/personal appliance recovery center in their city. The customer would pay a fine if they just threw the phone away down a garbage chute. If returned to the seller, the company should inspect the item and potentially send it to one of its refurbishing centers before selling the product again as new. If it finds its way into the industry recovery center, it would be sorted together with other consumer electronics from other appliances, then sent on to a smartphone dismantling facility. Every smartphone comes with an associated dismantling procedure which allows the machinery of the shared industry infrastructure to correctly dismantle it. From there, parts are sent to their respective material recycling facilities, where they are broken down to their constituent materials, and then delivered in bulk to a recycled material depot, making its way back to the start of the supply chain, closing the loop.

The Public Sector Supporting Industries

So far, we have considered all the important industries in Technoland's economy, and contextualized them in terms of the products and services they provide to companies and consumers. However, it is important to highlight the projects these industries undertake on behalf of clients in the public sector, which provide public infrastructures, utilities, and services. We will quickly consider these public sector projects now.

Navigating life in Technoland without a personal computing device is difficult; they are necessary for using public services, being productive, and for communicating. The use of technology has become an intrinsic, compulsory part of life. There exist subsidized, non-profit organizations oriented to the production of cheap smartphones and provision of accessible network plans with the goal of guaranteeing every citizen has access to basic web connectivity, information, and opportunities.

Industries oriented to public infrastructures & utilities provide a base framework on top of which society operates. All the enabling industries have clients in the public sector (ministries), providing construction services for public roads, footways, spaces, illumination, and office buildings, as well as grids for energy and water supply, sewers, waste management, and associated facilities (clean energy production and storage [renewable & nuclear power plants, industrial batteries], sewage treatment, recycling). Utility plants' machinery and SCADA systems need to be developed too.

The main public services (education, healthcare, and transport) are supported by a wide variety of industries. For education, this comprises industries of educational resources (produced by volunteers, accessible via the main online education platform), stationery, and scientific instruments and research equipment. For healthcare, this includes the industries of medical equipment, machinery, and instruments, and the pharmaceutical industry, which is regulated to ensure safety, fairness, and accessibility. For transport, this consists of the automotive industry, which produces the shuttle fleet, and the industries of other transport vehicles (trains, ferries, gondolas, drones, etc.)

The public-sector-facing side of the ICT services industry provides for essential public ICT systems and online public services, running on secure ICT infrastructure. The public ICT systems are the fundamental distributed applications of society (i.e, governance, economic systems). Online public service systems have portals through which citizens access all public services, including, education, healthcare, transport. There also exist open platforms for most essential online services, including web search, e-commerce, social media & news, personal data storage, content sharing, and multimedia experience platforms. All of these systems running on public ICT hardware are developed and maintained by different teams in public and private organizations, including ministry working groups, DAOs, and IT consulting companies.

Emerging Industries

The established industries of Technoland enable a comfortable and high-tech lifestyle for all citizens, with innovations within them continuously improving the baseline and limit of individual material conditions in a sustainable way, but its main industries are fundamentally the same as those in less developed countries; the main differences in Technoland is that they are more efficient, sustainable, transparent, connected, fair. Thus, while current systems can always be optimized, new industries only come about from innovative technologies that solve fundamental challenges in new, better ways. As advanced as Technoland may seem from the outside, it does not represent the absolute limit of human development.

The limits of human ingenuity will only be reached when certain goals that have seemed unattainable for most of human history become a reality. These include: 1) building perfect information systems, 2) improving oneself at will without limitation, 3) indefinitely extending one's lifetime, 4) making anything from one's imagination real, 5) solving impossible problems, 6) creating truly intelligent artificial versions of humans, 7) communicating and controlling things directly with one's brain, 8) exploring space, 9) fully unburdening humans from all labor, and 10) being able to manipulate reality. The technologies that will enable us to achieve these goals may be unattainable, but that does not stop researchers from investigating them.

We will consider now, in turn, the technologies that may advance our pursuit of these objectives, so we may begin imagining the industries that might arise from them. For the first, scalable decentralized fault-tolerant systems represent a promising start. The second relates to research into transhumanism through genetic and cybernetic enhancement, while the third concerns innovative medical products and technologies. The fourth concerns additive manufacturing: adaptable/customizable assembly lines. The fifth relates to the engineering of advanced narrow AI, and quantum computing. The sixth is mostly connected to robotics and artificial general intelligence research. The seventh touches upon the intersection of neuroscience and cognitive computing, relating to neuroprosthetics, brain-computer interfacing, and biological computation. The eighth pertains to astronomy, aerospace engineering, and all of space technology. The ninth objective is one Technoland is close to achieving due to how successfully AI automation has been applied to deal with manual, business, engineering, and creative tasks, though tasks involving research, complex problem-solving, and social influence are challenging to automate, and likely require artificial general intelligence. Finally, the tenth objective, as far-out as it may seem, might be achievable with nanotechnology. Will Technoland's researchers ever develop technologies that achieve these goals and lead to the creation of new industries? Given time and financial support, probably.

Summary

The

Hoo boy, what a long section!

People are taught to think and care about where their shit comes from.

All durable durable household & personal products are designed to be recyclable by the existing infrastructure

People are taught to have the responsibility to return durable household & personal products that are faulty or that they no longer use (or sell them on a used-good market)

It is ILLEGAL to mass-produce something without having a plan for recycling that item - even if that plan is labeling the product with a label that says "throw this in that bin color"

- industries in general
- supply chains
- enabling industries
- consumer-oriented industries
- reverse logistics & extended producer responsibility
- the smartphone example
- public sector supporting industries
- emerging industries

Commerce

International Trade

The

Trade policy

Wind and wave energy stations in the ocean for zero-emissions international cargo transport. Wind-propelled ships with solar panels and multiple super batteries. Also describe the maintenance algorithm. Energy stations tether chords to ships that recharge them as they move past them.

Smart containers.

Ports

Domestic Trade

Wholesaling & Retailing

The

Data-driven wholesale & retail (tie-in to advertising industry)

Physical commerce - Commercial centers like El Corte Ingles

E-commerce - Alibaba lives

Commerce - NFTs for assets in seller companies blockchains, with attribute fields pointing to product id and buyer civil id

Regulation

Used goods market

Regulation

Advertising

Technoland's advertising industry is highly personalized but respects individual privacy. There exist several digital and physical advertising mediums, including apps, websites, public screens and holograms, and transport shuttles. People have a high degree of control over how they are tracked across the web, monitoring and being able to change how their data is used. The result is a complex advertising system that delivers the best possible ads to people, knowing what they want better than they do themselves, while having users only transmit to companies what is necessary for ad delivery and for ad performance to be measured, to inform their marketing decisions.

Ad recommender systems are highly personalized - therefore highly effective - and computationally efficient, while revealing little personal information to companies. At a high level, the system works as follows: people's personal computing devices cache a set of ads relevant to them, each with a lifetime, which operating systems use to fill in ad slots in apps or the web, or broadcast to nearby physical advertising mediums. The ads users are fed make use of clustering, so companies know the general groups of people ads are delivered to, and the success rate of their campaigns, but have no knowledge about who in particular saw their ads.

Companies typically produce complete adverts, ad templates, or ad parameters (e.g, the brand, message, tone & mood, product) in a standard form, which people's devices use to create ads dynamically, combined with granular personal information. This includes users' profile info, app usage or web browsing habits, social info, and even health data from digital twins (e.g, stress level, heart rate) to determine users' moods. These are combined with the most appropriate linguistic & artistic techniques to appeal to users at a precise moment. By making use of personal devices to create ads, messages are highly personalized, but a high level of privacy is maintained.

To make this system work, a few key pieces of information are needed. First, there must exist a common vector space representing the general characteristics of the population, i.e, ages, sexes, social & economic statuses, health conditions, interests, tastes, affinities, etc. The data points are filled in by census data, but are anonymized. Second, each person's personal devices must gather meaningful data on interests and habits of their owners from the online platforms they use (e.g, search, media streaming, shopping, social networks). With this information, each personal device has a detailed understanding of their owners, their preferences per app, and where they lie in the common vector space of the entire population. Carrying this information, devices anonymously consult a distributed ad server network - which is neutral infrastructure used by the entire industry - requesting ads, which are served based on what brands submitted; devices describe precisely the ads they want, but not who their owners are.

It is worth clarifying a number of important details about this advertising system. Devices, on their owner's behalf, request ads for product categories, but the specific brand of the product that is advertised is determined by the ad network; the distribution is proportional to the amount paid by each company in their product category; a given degree of visibility in a market and ad medium has an algorithmically determined price. Not all adverts need to be personalized, such as massive ads in large public screens. The main mediums which ads are served to are digital (i.e, media streaming services, social networks) so the infrastructure is optimized for it. By law, online platforms cannot sell personally identifiable information of their users for any purpose, including targeted advertisement. There are no bottlenecks or central points of failure in the distributed ad server network, which make use of open-source protocols. B2B advertising also occurs through this system, but ads of this category are reserved for the eyes of company decision-makers, and success rates are monitored differently.

There exists a standardized procedure and interface by which users buy products directly from ads, which can typically be accomplished with only three clicks: the initial, purchase order, and confirmation clicks. Having seen an ad, if a person buys a product thereafter, be it by digital or physical means, the success rate of the ad campaign is updated in the distributed ad server network. There exists a simple, streamlined web platform through which all companies submit their advertisements to the system; they must identify each campaign's target audience, the types of mediums the ads are prepared for, and supply the ad content, template, or parameters, along with product details. Subsequently, they can monitor their campaign's success rates.

Customer relationship management systems allow companies to analyze the success rate of their ad campaigns, and are integrated with numerous other systems, including the agnostic ad server network, and customer monitoring systems in stores. Due to this deep integration, companies can make highly informed decisions as to which marketing direction to take after ad campaigns, knowing its success rate among different groups, what decisions they were able to influence, social media engagement, and other factors. All this without having data on who was shown their ads.

It is important to note that this kind of information is never used to promote ideologies in a targeted way; with an electoral process completely oriented to the equal exposure of policies and ideas (rather than political characters), it is illegal to use the ad network for political campaigns. Furthermore, ad servers make use of reliable AI-based automatic detection of propaganda techniques to flag or block product ads that try to sell political ideas with them. The correctness of this detection is ensured by volunteer specialists of Technoland's learned societies, who also help to detect fraud.

There exists an independent decentralized organization with representatives of big and small companies, as well as the government and learned societies, responsible for managing the infrastructure of the unified advertising system. This organization maintains the network, hardware, and software, ensuring continuous smooth operation, upgrading and scaling it up when necessary, and implementing any fairness policies. The operating cost of the infrastructure is stable, so the price of ad visibility in a product category is mostly determined by demand (average amount of ad requests) and supply (the number of competing ad campaigns). Any revenue exceeding the necessary operating cost is given to research or charity organizations of the public's choosing, so companies effectively pay for advertisements in donations.

Let us consider a few examples of the advert system in action to understand how it works. If a person were in search of a new phone, and they were the type who enjoyed sharing pictures on social media, a phone with a high quality camera might be advertised to them, with this characteristic being emphasized in the promotional message. If they were outdoorsy, and enjoyed making trips to distant locations, models known for being ruggedized or having satellite connection could be advertised instead. Power users would be recommended top-of-the-line models, with ads exemplifying their particular intensive use cases, such as multitasking between productivity apps, or playing their favorite mobile game. The color of the model advertised would always match the potential customer's preference, matching or complementing the colors of other products they bought, or of the sports team they cheer for. Accessibility features would be emphasized for users with certain disabilities. In any case, the message of the advert would reflect the potential customer's present mood, greeting them if they are starting off their day, emphasizing fun features of the device or fun experiences they could have with it if they are bored or taking a break from work, or displaying a sendoff message at the end of the day. There are thousands of variables users' personal devices keep track of to fetch the best possible ads for them at any moment, and to personalize them in meaningful attention-grabbing ways.

This system has serious implications throughout all the industry, affecting how recommender systems work in general. Because companies are not allowed to sell personally identifiable information about their clients, they are decentivized from collecting more information than they need to from their clients, and our landscape of web services is safer in general because there's less information flowing around.

Influencer marketing.

Illicit Trade

The

Counterfeit, stolen goods

Drug market. There is no antidote to the drug problem. It is impossible to force people not to want drugs. We must rely on Band-Aid solutions. We can educate people thoroughly on the blight of drugs, make it really hard to produce, sell, or buy. Those involved might make their own coin, this can’t happen.

Recreational cannabis is legal. Prostitution too.

Financial Markets

Financial markets serve to raise funds for corporations that help further technological progress or enhance general quality of life, while preventing market crashes (and economic crises).
Should High-frequency trading be allowed? No.
Double down on a hard upper limit on individual wealth

The Stock Market
The

The Bond Market
The

The Derivatives Market
The

Public Services

Education

The
Daycares
Scientific and industrial development is the key to economic growth. < education
Education focused on eradicating ignorance, providing a complete understanding of the operation of society pushing students to draw bridges between areas of knowledge
Authentic online assessments via explanation a la khan academy mastery
Mastery-based learning; self-paced system at scale
More ideas on education: Sal khan 3b1b podcast 16:35
Tessellation, map coloring and meeting vertices for distribution of higher education institutions
It is impossible to guarantee that everyone will want to work and be educated and informed. We seek to raise this to a maximum level.
Academia & research. Supercomputers, quantum computers
Learned societies
Input research, output structure and corpus. Scrivener.
Archival storage of documents
Map of education-> Domain of Science
Education - accessible competitions
Culture

Healthcare

The
Epidemic containment plan, Contact tracing
Sedentarism, urban loneliness
Accompanying pregnant women
State funerary service, interesting funerals, tree grave? Organ donation?

Healthcare Industry:
The
Designed for accessibility and efficiency

continuous precise health monitoring through wearables, accessible measuring devices for different metrics (blood, weight, height, hormones, etc).
The business aspect of public healthcare:

medical equipment industry

pharmaceutical industry Pharmaceuticals industry as an extension of the public healthcare service. Details in the healthcare section.

Welfare

The

[Início - seg-social.pt]

Retirement
Life expectancy of the average citizen is around 100 years. As an individual accrues wealth over time, their aggregate yearly spending is computed, and used to inform them of how much, in total, would cost them to sustain their current lifestyle until they reach 100 years of age. Citizens pay for their own retirement.

The individual may elect to dedicate a large portion of their remaining monthly salaries to quickly meet this total cost in their retirement savings balance, or spend it elsewhere, which might raise their personal total retirement cost as a result. In other words, to maintain a more luxurious lifestyle beyond retirement, one must work for longer or save up more for retirement; it's up to the individual to balance their spending money against their retirement savings. Invested money cannot be withdrawn.

An individual may retire at any moment as long as they have met or superseded their minimum retirement savings cost, and may come out of retirement as many times as they like, but may not be employed and retired simultaneously. Once an individual retires, their retirement balance is mostly used to maintain their needs for sustenance, sheltering, healthcare, and transport, with a portion being made available monthly for free spending; the more one invests in their retirement savings beyond the minimum, the more they will have for free spending.

People's personalized retirement savings costs are computed without accounting for the increased mean spending of adults as they raise their children; their retirement savings balance is meant to satisfy only their needs of lifestyle maintenance until they reach the age of 100. Most individuals retire with their significant others only after their children have left their homes. If one lives beyond the age of 100, the government must upkeep at least their sustenance, sheltering, healthcare, and transport expenses. People are not forced to add to this retirement savings balance.

Social Assistance Programs

The

Emergency Services

The

Emergency response -> drones

How to systemically prevent corruption in the police corps?

Online Public Services

The

How we guarantee citizens are informed (government comm channels, dapps, open social media)

All users are stakeholders of the platforms (DAOs) and can change standards via initiatives

There are government teams responsible for developing all kinds of services. All teams build and share common interfaces (APIs & GUIs)

Services like (facebook -more friends oriented, reddit, news aggregators + legislation updates + PSAs, wikipedia + digital libraries, maps, weather, teams, notes, office, calendar, streaming services [videos, music, games] and the ICT infrastructure is built to deliver these services

This system has serious implications throughout all the industry, affecting how recommender systems work in general. Because companies are not allowed to sell personally identifiable information about their clients, they are decentivized from collecting more information than they need to from their clients, and our landscape of web services is safer in general because there's less information flowing around.

Conclusion - The Limiting Problems

The
problems of govern

problems of infra

problems of econon

problems of pubserv