50 PATTERNS TO DEVELOP A CITY THAT MAKES

Patterns are a set of multidisciplinary solutions and ingredients, translatable to a wide range of conditions. This set of pattern cards can help explore a new era of urban manufacturing: one that is compatible with the context, built around local communities and based on a sustainable use of resources.

The patterns are a discussion and decision-making aid for analysing, visioning, designing and monitoring sites or projects.

The work is developed by Cities of Making, a JPI Urban Europe funded research project.

cities
of making

ONE WAY OF USING THESE CARDS:

1 The facilitator makes a preselection of cards which are considered relevant for the problem or site.

2 Through discussion, set aside cards not deemed relevant, select others from the stack which are more important. Exchange your knowledge on the subject while doing so.

3 Through consensus or a vote, refine the pattern field to the agreed and necessary ingredients.

4 Use card 51 (the blank) to introduce a new pattern if the group thinks an ingredient is missing in the stack.

5 With the help of the facilitator, organise the cards according to scale, user, type of solution, etc. Explore connections between patterns, and establish clusters and relations.

6 Discuss what the resulting pattern field means for the site or problem at stake. How can the solutions or clusters of solutions be put into action? Where? How? What are alternative scenarios?

Head to www.citiesofmaking.com for more info.

R.1

MAKING
MAKING VISIBLE

Manufacturers need visibility to connect their products and services with the local market, while ensuring that the general public values what manufacturing does for the city.

Connected to:

R.2 / R.3 / R.10 / R.11 / B.3 / N.7 / N.10 / P.7 / P.8

PEOPLE NETWORKS & POLICY - TRANSCALAR

SOLUTIONS

To improve exposure of local manufacturers and communicate their production processes, build communications campaigns that address both immediate neighbours and the larger urban context. Visibility can come in many formats ranging from traditional advertising, to events and even exposing how the manufacturing process operates. Firstly, simple media campaigns can raise awareness of the materials, processes and people behind local products. This could come from public agencies, business organisations or community groups supported through ***R.10 Place-based Financial Levers.*** Secondly, ***R.2 Transparent Making*** can help build trust through creating traceability. Tours, open days and presentations allow citizens and neighbours to see for themselves - particularly for businesses with privacy and safety concerns. ***N.7 Local Design and Prototyping*** can be particularly captivating, while ***P.7 Spaces for Development and Education*** are useful to attract students. Finally, exposing making related infrastructure can render manufacturing an attraction in itself. A ***B.3 Public Face*** is a simple and important way to expose the production process and also to improve brand awareness, strengthen local cultural identities and potentially increase customers. To apply all of these interventions, it is useful to have an elected messenger such as the ***R.3 Curator*** who has the responsibility to communicate a realistic view of the local manufacturing sector.

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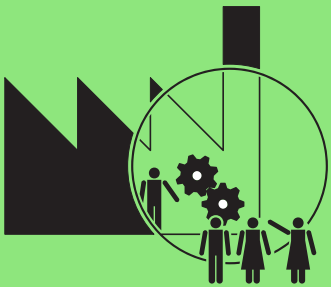
R.2



TRANSPARENT MAKING

Providing transparency in environmental, economic, and social processes helps building trust and acceptance of urban manufacturing, while also founding a basis for interaction and collaboration between businesses.

Connected to:
R.1 / R.3 / R.5 / R.11 / R.12 / B.3 / P.8

PEOPLE NETWORKS & POLICY – TRANSCALAR

SOLUTIONS

To improve the legitimacy between local clients and manufacturers, find both statistical data and factual information that can help clients, public authorities and neighbours to make informed decisions. As conventional statistics rarely provide a realistic insight into how business operate, a comprehensive list of economic and socio-spatial indicators should be built and sourced locally. This will require both qualitative and quantitative data collection of what happens on the specific site. This can start with an annual door-knocking survey and evolving into a more comprehensive (digital) accountancy tool. For example a ***R.12 Material Database*** provides improved insight into resource flows. Friction between manufacturers and their neighbouring housing areas can simply involve improving communications which can avoid social and financial policing costs. To support the use of public databases, ***R.11 Incentives for Research & Development*** could be mobilised. Public institutions can encourage businesses to build more open façades (***B.3 Public Face***) to make them more accessible, encourage businesses to run tours and support the development of a ***P.8 Community Hub in Making Locations*** to act as a bridge between makers and the larger community. Companies can provide more transparency by investing in communications campaigns, ***R.1 Making Making Visible.*** For businesses in mixed neighbourhoods, assigning a responsible staff member responsible for community relations liaison can avoid conflicts while potentially stimulating tourism. In industrial neighbourhoods this could be managed by the ***R.3 Curator***.

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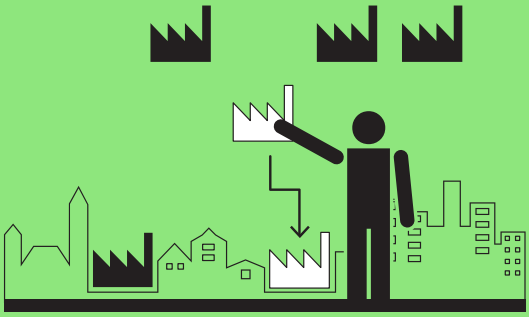
R.3



CURATOR

The curator helps businesses or neighbourhoods by aligning interests, building partnerships, exploring needs, communicating news and protecting community interests.

Connected to:
R.1 / R.2 / R.4 / R.6 / R.9 / R.10 / R.11 / C.1 / C.2 / C.4 / N.3
N.4 / P.2 / P.4 / P.8

PEOPLE NETWORKS & POLICY – TRANSCALAR

SOLUTIONS

Launch a curator to link businesses and concerned stakeholders, to identify local opportunities and defend common issues. Firstly, the role of the curator needs to have buy-in from at least the local businesses and where possible also the concerned public authorities. Second, once a commitment to the role has been made, the objectives of the role must be defined according to the needs of the project or site. This could include negotiating for ***R.10 Place-Based Financial Levers***, finding ***R.11 Incentives for Research & Development***, developing a vision for ***R.1 Making Making Visible*** or pushing for more ***R.2 Transparent Making***. It could involve optimising businesses' needs through ***N.4 Clustering Similar Making*** or ***N.3 Mixing Complementary Making and Related Services***. It may include enhancing socio-spatial integration through the ***R.4 Availability of Diverse Jobs*** and pushing for the most suitable and ***C.4 Diverse Tenure Models.*** Third, it will be necessary to define the scale of operation (such as building, neighbourhood or city scale) and role (such as facilitation, business development, area management, vision production or community building). Fourth, the role will need to be financed and this should reflect the interests, scale and responsibility of the curator. The curator can be either a person or organisation. It could also be public agency, private business, a freelance, a not-for-profit organisation, a university or even a chamber of commerce. It could be paid for through structural financing (***R.10 Place-Based Financial Levers***) particularly if the area is of strategic importance. It could be financed through research financing attached to a project (***R.11 Incentives for Research and Development***). It could also be funded by members or by providing a specific service.

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R.4

AVAILABILITY OF DIVERSE JOBS

A diversity in job opportunities that are fairly distributed across the city allows for workplaces to fit the skills, capacities and interests of the local workforce, provides businesses with options for staffing while ensures cities are resilient and accessible.

Connected to:
R.1 / R.3 / R.5 / R.10 / C.6 / N.10 / P.2 / P.3 / P.5 / P.6 / P.7

PEOPLE NETWORKS & POLICY – TRANSCALAR

SOLUTIONS

Provide the city with a wide diversity of jobs, build on both the competencies of existing available workers and long-term urban scale (policy) ambitions for accessible work. Firstly, inspiring students into vocational training, particularly women, is essential (see ***R.1 Making Making Visible***). Secondly, companies hiring and training employees in vulnerable circumstances (such as the disabled, migrants or ex-convicted felons) could be given advantages when applying for public financing, support or contracts. The social economy can be promoted and financially supported through tax cuts, subsidies and ***R.10 Place-based Financial Levers***. For example, subsidised work could include environmentally necessary but low-skilled work, like ***P.6 Re-use and Repair Centres,*** to reduce waste. Thirdly, where jobs and demand for employment exist, encourage 'social quotas' and campaigns to promote ***R.5 Fair Work Conditions***. A ***R.3 Curator*** could help bridge public interests, business opportunities and community needs. A diversity of jobs should also be fairly distributed across the city, ensuring a healthy social mix and allowing workers to have ***C.6 Strategic Access to Multimodal Mobility*** with healthy travel distances between work and home. Finally, cities should aim to provide a range of ways of training workers, supporting mentorships or internships for younger students, providing ***P.7 Spaces for Development & Education*** such as traditional training colleges or even a ***P.8 Community Hub in Making Locations*** that supports ***P.2 Shared Technology & Making Spaces***. In some cases freelance workers can take advantage of ***P.5 The Work Home*** or ***P.3 Flexible Spaces for Making***.

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R.5

FAIR WORK CONDITIONS

Fair working conditions are integral for providing good quality output, a reliable and agile workforce, a strong brand and in turn to promote manufacturing businesses as a valuable source of employment.

Connected to:
R.2 / R.4 / R.11 / C.6 / P.7

PEOPLE NETWORKS & POLICY – TRANSCALAR

SOLUTIONS

Ensure work conditions are dignified, comfortable, democratic and fair to support a motivated workforce. Firstly, job conditions should encourage diversity in the broadest sense, from skill level (***R.4 Availability of Diverse Jobs***), to ethnicity or sex - where imbalances occur, manufacturers should do their best (and be encouraged) to invest in diversity. Secondly, business structures could be adapted for profit sharing. Cooperatives can provide incentives for workers to feel responsible to adapt their working conditions to their needs while non-profit company structures can help push down overheads or encourage reinvestment of profits back into the business. Thirdly, the active participation of workers in a business' decision making process can help to motivate workers while helping them to take responsibility for changes and help them to prepare for change. ***R.2 Transparent Making*** can provide legitimacy and avoid miscommunication. Employers can improve quality through introduction of 'co-bots' or technical support, helping with repetitive tasks while supporting workers focus on quality control and creative thinking tasks. This also may require adapting the business model, distribution volumes or product pricing to benefit work conditions and improve the quality of products. Inspiring work conditions may offer ***R.11 Incentives for Research and Development*** and can be implemented, particularly within larger businesses, to motivate workers to also look for solutions to improve output. ***P.7 Spaces for Development & Education***, in addition to making time available for training, can help workers to build skills on the job and to adapt to new technology incrementally. Commuting times are also an important factor, which can be addressed through ***C.6 Strategic Access to Mulitmodal Mobility***.

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R.6

SUSTAINABLE PRODUCT CYCLES

Manufacturing contributes to city-scale circularity, helping reduce distances from resource to processing site, distribution and retail, and then to re-use, remanufacturing, material recovery and back to the production cycle.

Connected to:
R.2 / R.7 / R.8 / R.12 / C.8 / N.2 / N.5 / N.7 / B.8 / P.2 / P.5 / P.6

CIRCULARITY & TECHNOLOGY - TRANSCALAR

SOLUTIONS

Ensure suitable facilities are available to repair or re-use broken goods. Where possible, invest in high quality goods to minimise the likelihood of failure. Prioritise purchasing equipment and goods that can be easily repaired. For sustainable product cycles to be enacted, urban planning and economic policies must recognise the network of infrastructure to provide a regenerative service for goods and materials consumed within cities. This can be done through addressing and mapping out the spatial needs associated with repair, storage, recycling and waste. Each will have different resource management systems at the city or regional scale. Sustainable product cycles require different types of spaces and ***R.7 Multi-scalar Circular Infrastructure*** to address both waste collection points and levels of waste treatment. ***N.5 Local Collection Points of Segregated Waste*** are importantly linked to ***B.8 Space for Storage*** to allow material stockpiling. This can give entrepreneurs or ***N.7 Local Design and Prototyping*** organisations an incentive to turn waste into resource. Where possible build on existing waste management processes to ensure that users understand where waste must go and where to repair fixable things. However, where the system is blocked by regulation or policy, explore how to adapt it. In some cases, such as for organic materials, legislation may need to be changed to make the resource circular. Businesses that have their waste collected, should sort waste as best possible at the source so that the waste can be taken to a suitable treatment site - penalise those that fail to do so through ***R.10 Place-based Financial Levers***. ***P.6 Re-use & Repair Centres***, both privately managed and public centres, can be located near consumers or businesses to help lengthen product cycles while offering accessible and meaningful low-skilled work.

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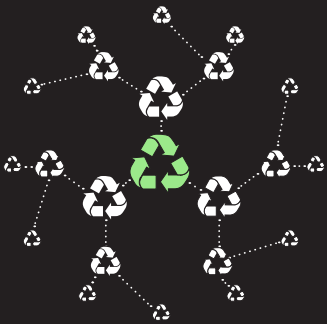
R.7



MULTI-SCALAR CIRCULAR INFRASTRUCTURE

A system of integrated infrastructure at different scales is required to manage resource flows (materials and energy) and to promote effective circular economy approaches.

Connected to:
R.6 / R.8 / R.10 / R.11 / R.12 / C.3 / C.7 / C.8 / N.2 / N.5 / N.6
B.7 / B.8 / P.1 / P.6

CIRCULARITY & TECHNOLOGY - TRANSCALAR

SOLUTIONS

Ensure that waste transfer infrastructure and material recovery plants are distributed across the city according to material supply and the most efficient scale for resource management to take advantage of local waste streams. Reusing local resources (waste), requires suitable material sorting and collection points, piping for heat networks, logistics points, online platforms and so forth in order to create more circular industrial ecosystems. Investment mechanisms (***R.10 Place-based Financial Levers***) should to be considered especially in large development projects where planning regulations requires integrating circular infrastructure (***N.2 Re-use of Materials & Energy Flows***), public investment in space, considering ***C.3 Balance between Public & Private Land*** could help facilitate this. To maintain the quality of waste resources, ***N.5 Local Collection Points of Segregated Waste*** are essential, requiring areas/space for separate segregation, collection and treatment infrastructure. Waste management centres (***C.8 Accessible Material Recovery Facilities***) are increasingly being located in mixed use neighbourhoods and are compatible with industrial co-location projects. Where labour costs are too high to deal with ***R.6 Sustainable Product Cycles*** and where businesses do not find the challenge commercially viable, social enterprises could step in to help maintain value of products and material through disassemblage or remanufacturing.

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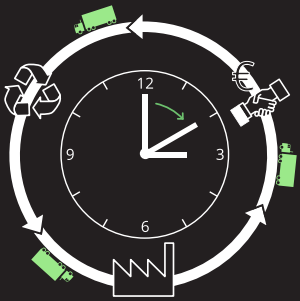
R.8



MOVING THINGS EFFICIENTLY

Time-distance efficiency in logistics contributes to sustainable and competitive manufacturing.

Connected to:
R.10 / C.1 / C.3 / C.7 / N.6 / N.10 / N.11 / B.3 / R.10

CIRCULARITY & TECHNOLOGY - TRANSCALAR

SOLUTIONS

Develop a city wide approach for logistics to help makers focus on making. Moving things efficiently requires a combination of well thought out storage, low impact transport and timely distribution. Manufacturers should consider if to be located close to clients and staff (***C.6 Strategic Access to Multimodal Mobility***) or closer to supplies and suppliers (***C.7 Links to Transport Infrastructure***). A ***N.6 Centralised Logistics Zone*** could allow collective storage and distribution, using vehicles that are more suited to urban conditions than large trucks while allowing night time deliveries to help evade congestion. Cities are beginning to explore alternative mobility options that are less exposed to congestion, such as the use of barges on canals and cargo-bikes. Manufacturers with a ***B.3 Public Face*** or a focus on retail should consider ***N.10 Making Along High Streets*** or ***N.11 Back of the High Street*** in order to be closer to clients. Planning instruments could facilitate better logistics by providing the right combination of infrastructure (such as collective storage, combined logistic systems) and ***R.10 Place-based Financial Levers.*** Businesses also need ways to adapt to policies oriented towards reducing congestion or improving air quality, which could include exceptions for logistics or subsidies to acquire low impact transport modes. Logistics hubs could be developed in the course of ***C.1 Microzoning*** and even acquired by public actors (***C.3 Balance between Public & Private Land***).

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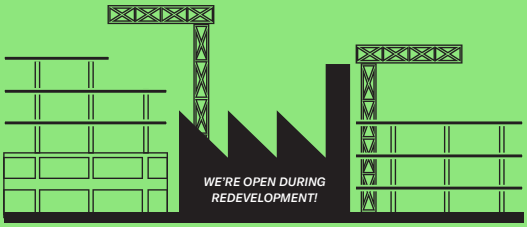
R.9



ASSURED SECURITY OF SPACE

Businesses require reliable long term access to their manufacturing space in order to make investment in staff, technology and local networks.

Connected to:
R.3 / R.4 / R.8 / R.10 / C.1 / C.2 / C.3 / C.4 / C.5 / C.6 / C.7
C.9 / N.1 / N.6 / N.8 / N.9 / P.2

PEOPLE NETWORKS & POLICY – TRANSCALAR

SOLUTIONS

Build on three particular approaches for assuring space - through urban planning, finance and community management. Firstly, simple planning principles can limit conflicts by ***N.1 Taking Advantage of Place Conditions***, ***C.9 Concentrating Messy Making Along Infrastructure*** and ensuring ***N.9 Making Touches Making***, ***C.6 Strategic Links to Mobility Infrastructure*** to allow access by heavy transport, may need to be complemented by solutions for ***R.8 Moving Things Efficiently*** or investing in a ***N.6 Centralised Logistics Zone***. For sites that no longer attract larger industrial activities, ***C.1 Microzoning*** may be able to offer an alternative type of space that is more accessible to smaller manufacturers. Secondly, ***R.10 Place Based Financial Levers*** could be applied to manage rental prices or taxation. Avoid available industrial land to be used by activities that can afford to be located in commercial areas (such as offices or retail). If policy is developed to reduce emissions, compensation should be required for manufacturers to invest in new equipment. Public actors can show assurances by investing in industrial areas to provide a ***C.3 Balance between Public & Private Land***, build ***P.2 Shared Technology & Making Spaces*** and offer ***C.4 Diverse Tenure Models*** to correct market imbalances. Finally, manufacturers should define clear needs and dedicate energy to negotiate with planning authorities while developing positive relationships with neighbours in residential areas (see ***R.3 Curator***).

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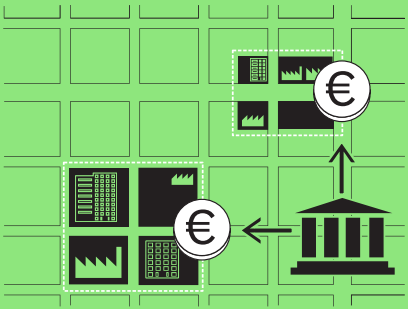
R.10



PLACE-BASED FINANCIAL LEVERS

Financial instruments are important mechanisms to improve neighbourhood scale infrastructure and technology, while rendering businesses more compatible with their context.

Connected to:
R.1 / R.3 / R.4 / R.6 / R.8 / R.11 / C.1 / N.2 / P.1 / P.4 / P.6 / P.7

PEOPLE NETWORKS & POLICY – TRANSCALAR

SOLUTIONS

Use public financial levers as tools to align concerned actors and local businesses in order to enact changes to technology, production processes, land use or changes to public space. Financial levers are best implemented within the framework of an economic or spatial vision, such as ***C.1 Microzoning***. This may require financial incentives to deliver results if the market is not prepared to invest in development. A ***R.3 Curator*** or area manager can be assigned to mediate between the vision, the businesses' needs, and provide feedback on which financial levers have successful results. Through ***R.1 Making Making Visible***, a message can be communicated to a general public to show ambitions and the consequences of the vision. Business incentives such as carrots (funding) and sticks (taxation) can be used to negotiate. For example, financing (loans) could be made available for businesses to change logistics habits by purchasing a small electric vehicle for ***R.8 Moving Things Efficiently***. Public funding can be used for companies to invest in innovation through ***R.11 Incentives for Research & Development*** or to create ***P.1 Productive Rooftops***. Tax breaks could be offered to provide ***P.7 Spaces for Development & Education*** or ***P.6 Re-use & Repair Centres***. Taxes and fines can be levered to improve the use of land and avoid unnecessary blight through ***P.4 Meanwhile spaces and Transitional Uses***, ***N2 Re-use of Materials & Energy Flows*** and for ***R.6 Sustainable Product Cycles***. Likewise, in neighbourhoods undergoing rapid gentrification, increasing rents could be compensated through local land taxes to prop up foundational forms of manufacturing to increase ***R.4 Available of Diverse Jobs***.

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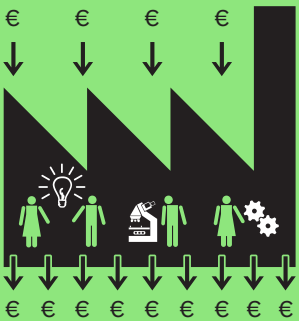
R.11



INCENTIVES FOR RESEARCH & DEVELOPMENT

Cities can stimulate research and development through incentives such as providing finance and space, offering technical support, business development and support with tenders.

Connected to:
R.1 / R.3 / R.8 / R.9 / R.10 / C.4 / N.3 / N.7 / P.2 / P.3 / P.4
P.7 / P.8

PEOPLE NETWORKS & POLICY – TRANSCALAR

SOLUTIONS

Use incentives to kick-start change and innovation while penalising poor behaviour. Build where possible incentives around a local brand, ***R.1 Making Making Visible***. Incentives can be framed within a local economic vision to help orchestrate efforts for collaboration to strengthen the local economy (such as between the public sector, non-profits, universities and private companies). ***R.10 Place Based Financial Levers*** can be used to help cluster businesses around a certain theme or activity (such as the circular economy or advanced engineering) which could include tax deductions or tax credits. Access to space is essential to test or develop ideas and prototypes. This may include: rental spaces (***C.4 Diverse Tenure Models***), ***P.4 Meanwhile spaces and Transitional Uses***, ***P.3 Flexible Spaces for Making*** or long-term investment through ***R.9 Assured Security of Space***. Proximity, or ***N.3 Mixing Complementary Making & Related Services***, can ensure 'thinkers' and 'makers' can easily collaborate. Likewise, a ***P.8 Community Hub in Making Locations*** can help build informal relationships that spark new ideas while ***N.7 Local Design and Prototyping*** and ***P.3 Flexible Spaces for Making*** can bring ideas to life. ***P.7 Spaces for Development & Education*** may be necessary for developing skills, particularly when new products require using new technology. Any form of incentive could be followed up by a ***R.3 Curator*** to help guide future development and help refine future investment.

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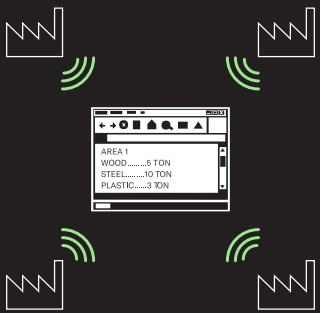
R.12



MATERIAL DATABASE

A centralised spatially connected database, containing data on flows of material (and waste), helps to facilitate and optimise local distribution of resources and maximise opportunities for material recovery.

Connected to:
R.1 / R.2 / R.3 / R.6 / R.7 / R.10 / R.11 / C.1 / C.8 / C.10 / N.2
N.3 / N.4 / N.5 / N.7 / P.3 / P.6

CIRCULARITY & TECHNOLOGY - TRANSCALAR

SOLUTIONS

Gain a clear indication of resource demands and production of waste by exploring ways to provide an accurate picture of the local situation. Sourcing materials, capturing waste and recovering resources requires extensive collaboration among municipalities, waste managers/contractors, households, manufacturing activities and recovery facilities. It involves assembling a picture of materials used, waste streams and storage locations. Tracking waste can be threatening to companies concerned with exposing commercially sensitive data. However public authorities or park managers will struggle to invest in effective resource management without clear guarantees based on trends. Therefore, it is important that appropriate procedures are put in place to generate a realistic picture of material flows while assuring businesses with necessary anonymity and privacy. A neighbourhood scale park manager or ***R.3 Curator*** could help build the trust required to source information from businesses such as running an annual survey. ***R.10 Place-based Financial Levers*** could be used to tease out data where necessary. Alternatively, managing waste with a single operator at the neighbourhood scale for ***N.2 Re-use of Materials & Energy Flows***, can reduce complexity if data collecting and sharing agreements are made. ***R.11 Incentives for Research & Development*** can focus on a limited range of resources to reduce possible data issues.

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C.1

MICROZONING

Strategically enabling zoning exceptions can protect vulnerable land uses or provide the grounds for experimentation in mixing land uses and building types.

Connected to:
R.3 / R.9 / C.2 / C.3 / C.4 / C.5 / C.6 / C.9 / C.10 / N.3 / N.11
B.1 / B.2 / B.5 / B.6 / P.5 / P.6 / P.8

PEOPLE NETWORKS & POLICY - CITY/NEIGHBOURHOOD

SOLUTIONS

Use microzoning to provide a range of unique interventions or activities which cannot be developed under standard planning regulation or where unique conditions are present. A ***R.3 Curator*** can be an essential guide to interpret the ambitions for the microzoning and the application on the ground. This role could involve protecting businesses, intensifying development (industrial intensification), creating greater symbiosis between businesses or developing suitable mixed-use neighbourhoods (co-location). ***C.6 Strategic Access to Multi-modal Transport***, is a trigger for industrial intensification and co-location, particularly for sites located near a train, tram or metro station. Considering that Microzoning can involve mixed use, it could be used strategically as ***C.10 Transition Zones*** between residential/commercial areas and industrial areas. Microzoning can provide public authorities with a negotiation tool to access space and therefore acquire sites for manufacturing to increase ***C.3 Balance between Public & Private Land***. If planned strategically, Microzoning can accommodate solutions for ***N.3 Mixing Complementary Making & Related Services***, which could include a ***P.8 Community Hub in Making Locations*** and ***P.6 Re-use and Repair Centres***. ***C.5 Varying Plot Sizes*** and ***C.4 Diverse Tenure Models*** can also be planned with microzoning. ***C.9 Clustering Messy Making Along Infrastructure*** and ***B.5 Enabling Vertical Making*** can shield housing or other activities which are more sensitive to noise. ***B.1 Making Around Courtyards***, a ***B.2 Yard for Logistics*** and making at the ***N.11 Back of the High Stree***t are ways to provide ***B.6 Easy Loading and Unloading*** and to avoid conflict with pedestrians.

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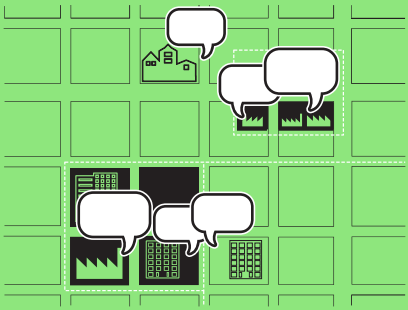
C.2



NEGOTIATED QUALITIES & ENVIRONMENTAL CRITERIA

The environmental impact of manufacturing can impact areas far beyond the production site, requiring informed decisions by affected stakeholders to be made to avoid conflict and unintended consequences.

Connected to:
R.1 / R.2 / R.3 / R.4 / R.6 / R.8 / R.10 / C.1 / C.9 / N.2 / N.3
N.5 / N.9 / B.1

PEOPLE NETWORKS & POLICY - CITY/NEIGHBOURHOOD

SOLUTIONS

Ensure a platform is available for debate and collaborative decision making while providing conditions for constructive discussions that minimise long-term conflict. Develop trust by providing stakeholders and interest groups with suitable amounts of information that clearly and honestly explains the situation at hand (refer to ***R.2 Transparent Making*** and ***R.1 Making Making Visible***). Ensure discussions contain broader issues of material extraction and foreign production processes (***R.6 Sustainable Product Cycles***) to avoid discussions focusing on NIMBYism or financial value. A respected intermediate actor, such as a local ***R.3 Curator***, could help both communicating the environmental impact to actors and interest groups while hearing their concerns, and helping find workable solutions. At the planning stage, particularly with ***C.1 Microzoning*** projects, explore solutions to reduce nuisances through ***C.9 Concentrating Messy Making Along Infrastructure***, ensuring ***N.9 Making Touches Making*** or concentrating ***B.1 Making Around Courtyards***. Where decisions are made to increase environmental standards, the most vulnerable businesses should be fairly compensated by ***R.10 Place-based Financial Levers***. Some businesses find simple dialogue and open doors events (***R.1 Making Making Visible***) are enough to help local residents better appreciate the production process and reduce preconceptions about what manufacturing activities entail. Participatory processes and matchmaking between businesses can offer constructive outcomes for ***N.2 Re-use of Materials & Energy Flows*** through ***N.5 Local Collection Points of Segregated Waste.*** This can lead to ***R6 Sustainable Product Cycles***.

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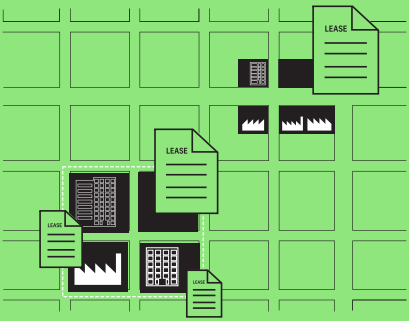
C.3



BALANCE BETWEEN PUBLIC & PRIVATE LAND

Public ownership of manufacturing space enables public interests to have an active stake in neighbourhood issues while ensuring space is available for unconventional or foundational forms of manufacturing.

Connected to:
R.1 / R.3 / R.9 / R.10 / C.1 / C.4 / P.7 / P.8

PEOPLE NETWORKS & POLICY - CITY/NEIGHBOURHOOD

SOLUTIONS

Ensure public actors acquire assets to support a more diverse and just economic agenda, to protect or boost manufacturing and to correct conditions due to market failures. There are three aspects to the balance of public and privately owned land, namely: acquisition, development and management. Firstly acquiring and developing land can be difficult for cash-poor public authorities. However industrial land has been seen as a major investment opportunity by the private sector and can offer more attractive returns than housing in the long-term. Cities that can afford to purchase land, can help contribute to ***C.4 Diverse Tenure Models*** by filling any gaps in the market. Public authorities can strategically acquire industrial spaces in the process of adapting land for ***C.1 Microzoning*** - this can be a win-win if the private developer profits from the residential surface area at the cost of the construction of industrial space. Public authorities can also acquire land through larger infrastructure development (such as a highway) however this is far rarer and more expensive. Conversely, public authorities can purchase strategically important sites (like a market or waste management centre) and then sell the access to the site through time-share or lease the site management to a third party. Finally, the ***R.3 Curator*** can take on the role of asset manager and define rental/usage conditions. Where possible communicate plans and priorities by ***R.1 Making Making Visible***.

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C.4

DIVERSE TENURE MODELS

A range of land and property tenure models allows for manufacturing space to be accessible to businesses according to their financial means and ownership needs.

Connected to:
R.3 / R.9 / C.3 / C.5 / P.4

PEOPLE NETWORKS & POLICY - CITY/NEIGHBOURHOOD

SOLUTIONS

Provide a suitable mix of tenure models to offer space for diversity of business types in different phases of their development. Where necessary use public acquisition of manufacturing spaces to balance the real-estate market. The ***R.3 Curator*** can help look for suitable space while helping businesses to use their sites more effectively. A ***C.3 Balance between Public & Private Land*** also means that prices can be regulated subject to the importance of a certain business to the city. Tenure models are often linked to plot sizes (smaller spaces are typically rented while larger sites are owned), therefore offering ***C.5 Varying Unit Sizes*** is crucial. This can ensure business of various sizes and financial means can find their place. Ensuring that there is some unoccupied space can be important to allow businesses to move easily based on their needs rather than the limitations of the market. Ensuring the market has a vacancy rate (around 5% from small to large spaces) can provide options and space to grow. While this may seem counter-intuitive, a buffer allows for emergencies (such as fire) and retaining free space means efforts can be made to acquire more space if demand increases. In practice, developing new space could take a decade to realise. Secondly, by retaining a small buffer, real-estate rental rates can be managed. Finally, ***P.4 Meanwhile Spaces and Transitional Uses*** are also useful for very young or risk-taking businesses who want to minimise their real-estate costs.

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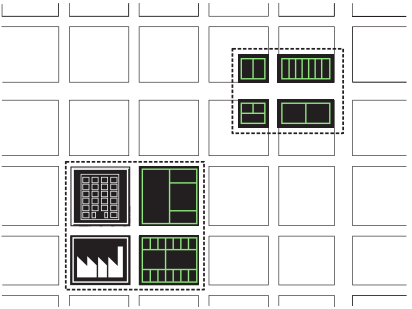

VARYING UNIT SIZES

Variations of unit sizes help to promote a variety of business types and facilitates manufacturers growing or shrinking without needing to leave an established neighbourhood.

Connected to:
R.9 / C.1 / C.3 / C.4 / N.3 / N.10 / B.1 / B.5 / P.2 / P.3 / P.4 / P.5

URBAN INTEGRATION - BLOCK/BUILDING

SOLUTIONS

Ensure a range of unit sizes are available to provide businesses with a choice of space subject to their needs. Where possible, adapt sites or buildings to provide a variety of unit sizes. ***C.1 Microzoning*** can be triggered to adapt existing sites and help ***N.3 Mixing Complementary Making & Related Services***. ***R.10 Place Based Financial Levers*** could help to balance market forces to incentivise a variety of unit sizes (refer to ***C.3 Balance between Public & Private Land***) or to help dealing with increasing rent. Alternative manufacturing spaces such as ***P.5 The Work Home*** can be encouraged for smaller spaces. For younger and experimental businesses, ***P.4 Meanwhile Spaces & Transitional Uses*** can be useful. ***P.2 Shared Technology & Making Spaces*** allow particularly smaller manufacturers to have flexibility and access to affordable space when it is needed. Sharing also makes it easier for businesses to move spaces. The architecture of shared buildings should provide the possibility to easily adjust the size and function of working areas (see ***P.3 Flexible Spaces for Making***). With a large enough goods lift (***B.5 Enabling Vertical Making***), manufacturing can occur in multi-storey buildings, allowing industrial intensification to achieve more efficient land use. It is thus useful to develop a diversity of unit sizes on the urban as well as on the architectural scale.

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C.6

STRATEGIC ACCESS TO MULTIMODAL MOBILITY

The location of a business will depend on defining strategic priorities regarding accessibility by clients, partners, staff and the cost of space.

Connected to:
R.1 / R.4 / R.5 / R.6 / C.7 / N.6 / N.8 / B.1 / B.2

PEOPLE NETWORKS & POLICY - CITY/NEIGHBOURHOOD

SOLUTIONS

Prioritise manufacturing locations according to a variety of available mobility options in order to draw on workers, employees and clients. Businesses should resist simply looking for the most affordable land and consider sites that benefit accessibility of employees and clients. Workers with manageable home to work times (around 30 minutes) are happier and less stressed, contributing to ***R.5 Fair Work Conditions***. Creative solutions should be considered to deal with high(er) land costs such as ***B.1 Making Around Courtyards***, a shared ***B.2 Yard for Logistics*** or even outsourcing storage with a ***N.6 Centralised Logistics Zone***. Furthermore, bike parking and showers should be provided to encourage workers to use soft mobility while public authorities should provide suitable cycling and pedestrian infrastructure into industrial areas. As the pressure on industrial land increases, public authorities are allowing or encouraging industrial intensification and co-location with other land uses. Public authorities that allow this, should also look for ways to improve public transport services or install safe soft mobility infrastructure to avoid dedicating precious road space to parked cars.

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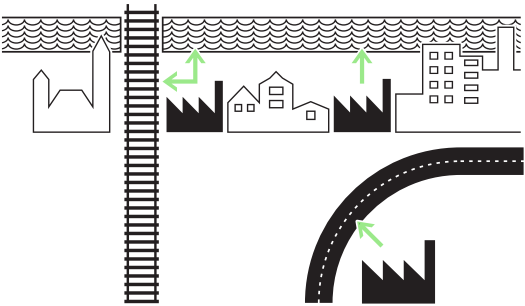

LINKS TO TRANSPORT INFRASTRUCTURE

Manufacturing benefits from being near relevant infrastructure, multimodal logistics hubs and good access to distribution networks.

Connected to:
R.7 / R.8 / R.9 / C.3 / C.4 / C.6 / C.8 / C.9 / N.1 / N.2 / N.5
N.6 / N.10 / P.2

URBAN INTEGRATION – CITY/NEIGHBOURHOOD

SOLUTIONS

Where possible locate or connect manufacturing to infrastructure to improve accessibility and reduce impact on non-industrial land. Zoning manufacturing uses close to infrastructure can help bundle activities with similar nuisances (such as noise and pollution). ***C.9 Concentrating Messy Making Along Infrastructure*** and ***N.1 Taking Advantage of Place Conditions*** can help concentrate noise and pollution in specific areas to ensure that manufacturing is accessible but does not affect other land uses, like residential areas and public space. Furthermore, areas on or beside noisy or busy infrastructure can be ideal to couple with manufacturing in order to offer ***R.9 Assured Security of Space***. Land could be publicly owned (***C.3 Balance Between Public & Private Land***) and leased on a timeshare arrangement (***C.4 Diverse Tenure Models***) to ensure that sites remain protected from speculation. In inner city locations, where traffic restrictions or congestion is a concern, placing ***N.10 Making Along High Streets***, those that are better connected to regional networks, or having a ***N.6 Centralised Logistics Zone*** and fleets of smaller electrical vehicles should be considered. Sustainable manufacturing can be efficiently bundled with transport infrastructure to ensure ***N.2 Re-use of Materials & Energy Flows*** by having ***C.8 Accessible Material Recovery Facilities*** and/or ***N.5 Local Collection Points of Segregated Waste***.

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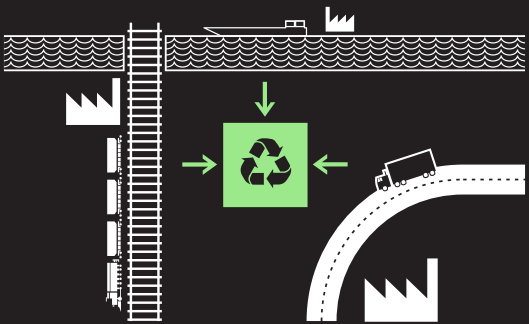

ACCESSIBLE MATERIAL RECOVERY FACILITIES

Waste processing and recycling facilities must be locally accessible through efficient logistics networks.

Connected to:
R.4 / R.6 / R.7 / R.8 / R.12 / C.7 / N.2 / N.5 / N.6 / P.6

CIRCULARITY & TECHNOLOGY - CITY/NEIGHBOURHOOD

SOLUTIONS

Provide material recovery facilities based on the scale that they function most efficiently for both the waste producer and the use/treatment of the specific waste stream. Before defining what kind of material recovery facilities could be implemented, the composition of urban waste must be better understood, which can be done with a ***R.12 Material Database***. The design criteria for accessibility and a hierarchy of facilities can be then considered strategically at different geographical scales. As waste can lead to congestion, waste transport should be considered at a metropolitan scale for ***R.8 Moving Things Efficiently***. To minimise congestion and potential hazards, ***N.5 Local Collection Points of Segregated Waste*** may reduce accessibility problems to recovery facilities by consolidating waste and reducing unnecessary transport. Having the segregated waste collection points connected to recovery facilities through the ***R.12 Material Database***, the most common waste streams can be dealt with according to demand. Social enterprises (***R.4 Availability of Diverse Jobs***), with public subsidies, can be supported to deal with manual labour based around treating low value materials while private companies can be engaged to treat high value materials. Locating facilities adjoining ***C.7 Links to Transport Infrastructure*** can provide opportunities to use lower emissions and efficient combinations of transport modes while adapting to the ***R.7 Multi-Scalar Circular Infrastructure*** and recovery options beyond the city.

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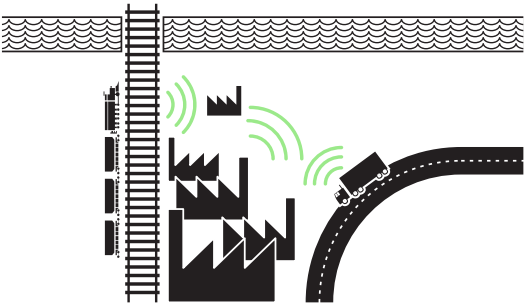

CONCENTRATING MESSY MAKING ALONG INFRASTRUCTURE

Concentrating manufacturing activities that produce noise, dust, and problematic odours along infrastructure, minimises nuisances.

Connected to:
R.9 / C.1 / C.2 / C.7 / C.10 / N.1

URBAN INTEGRATION – CITY/NEIGHBOURHOOD

SOLUTIONS

Where possible reduce nuisances by concentrating manufacturing along infrastructure. Focus first on the needs of city oriented heavy manufacturing to create ***C.7 Links to Transport Infrastructure*** for ***R.8 Moving Things Efficiently***. Take advantage of edges, enclaves or drosscapes that are generated through large infrastructure that runs across urban regions and is secluded from the city and its surroundings. ***N.1 Taking Advantage of Place Conditions*** by design, could use these areas to host and protect large scale, 'messy' manufacturing. Infrastructure, particularly roads and rail, is also noisy, yet it will continue to be fundamental in cities. In fact, freedom to make noise and odours and operate on a 24 hour basis provides benefits for businesses. A ***R.3 Curator*** could help defining complementary forms of manufacturing that result in similar nuisances. Organising these businesses in ***C.10 Transition Zones*** could be done in a way in which ***N.9 Making Touches Making***, but following a noise gradient away from the infrastructure, in accordance with ***C.2 Negotiated Qualities & Environmental Criteria*** concerning adjacent areas. In more dense urban contexts, building design could help to attenuate noise and dust. As infrastructure is slow to change, manufacturers could be given ***R.9 Assured Security of Space*** by investing more in their factories, using sturdier and heavier materials with higher levels of noise insulation.

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C.10

TRANSITION ZONES

Zones adjoining industrial areas can provide ideal space for small to medium size manufacturing businesses and supporting services that help transition into mixed-use and residential areas.

Connected to:
R.3 / R.4 / C.1 / C.5 / N.3 / N.9

URBAN INTEGRATION – CITY/NEIGHBOURHOOD

SOLUTIONS

Develop planning and development mechanisms to allow transitions between industrial areas and other land uses. Transition zones may involve three types of gradients: 1) scale of space, 2) publicness of space and 3) degree of nuisances. Firstly, the scale of available space should start from ***C.5 Varying Unit Sizes***. This can include small spaces in mixed use buildings located along main streets or as integrated workplaces within dwellings (***P.5 The Work Home***) as part of residential or mixed use neighbourhoods. It can grow to larger scale plots and buildings along infrastructure, ***N.1 Taking Advantage of their Place Conditions***. Transitions can range from mixed high streets (refer to ***P.5 The Work Home*** and ***N.11 Back of the High Street***) towards clusters of similar types of manufacturing (***N.3 Mixing Complementary Making & Related Services***). Secondly, the publicness gradient of space can vary between the type of activity. Making at home is private while making along the high street is very public. Larger manufacturing spaces tend to be located away from very publicly accessible sites and behind walls or gates unless there is a ***B.3 Public Face***. Thirdly, gradients of nuisances depends heavily on the business type, the proximity to other manufacturers (***N.9 Making Touches Making***) and how close a business is to residential areas. ***C.1 Microzoning*** is a sensible way to structure formal and informal manufacturing spaces within mixed use neighbourhoods.

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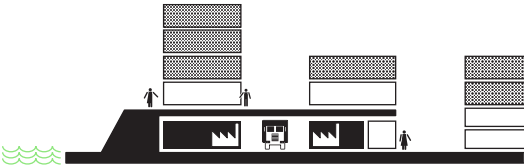

TAKING ADVANTAGE OF PLACE CONDITIONS

Making use of place qualities and particularly existing conditions along rivers, canals and railway arches can use these special conditions advantageously to accommodate manufacturing.

Connected to:
C.1 / C.2 / C.7 / C.9 / N.8

URBAN INTEGRATION – NEIGHBOURHOOD / BLOCK

SOLUTIONS

Use edge conditions created by infrastructure or natural geography to advantage manufacturing in industrial areas. Strategic ***C.1 Microzoning*** with ***C2 Negotiated Qualities & Environmental Criteria*** along edge conditions (such as railways, roads or dykes) can help to maintain manufacturing, particularly in mixed-use areas. The proximity to highways or train lines could be a good place for ***C.9 Concentrating Messy Making Along Infrastructure***. An increasing share of empty shops in high streets provides places with excellent connectivity and optimal access to staff and clients and thus promotes ***N.10 Making Along High Streets***. It is also key to take advantage of buildings like decommissioned parking facilities, which offer high weight carrying ceilings, that could be repurposed for manufacturing. Industrial intensification or ***B.5 Enabling Vertical Making***, could be concentrated along special infrastructure that helps to protect the manufacturing spaces. Dykes or berms and natural topography could be used advantageously. This can allow the public facing activities on one side and the manufacturing at the other, with noised buffered through height differences in the building, resulting in ***N.8 Quality Urban Environment in Making Areas***. An important aspect to consider with places related to water, is the risk from flooding, thus design should integrate suitable water management measures.

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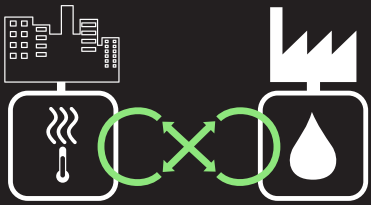

RE-USE OF MATERIAL & ENERGY FLOWS

Local production of waste water, materials and heat could be turned into innovative new uses, to reduce the dependency on primary raw materials and reduce environmental pressures.

Connected to:
R.3 / R.6 / R.7 / R.10 / R.11 / R.12 / C.2 / C.7 / C.8 / C.10 / N.3 / N.4 / N.5 / N.6 / B.1 / B.7 / P.6

CIRCULARITY & TECHNOLOGY - NEIGHBOURHOOD/BLOCK

SOLUTIONS

Take advantage of waste materials and unused energy, by developing workable synergies between waste creators and business that can make use the waste. Resource recovery requires addressing three aspects. Firstly it requires an understanding of the flows of material, water and energy within the system which can be done with a ***R.12 Material Database***. Secondly it requires appropriate ***R.7 Multi-scalar Circular Infrastructure*** to be able to recover the resources. This could involve ***N.5 Local Collection Points of Segregated Waste*** or ***C.8 Accessible Material Recovery Facilities*** which could be combined within a ***N.6 Centralised Logistics Zone***. New projects should take resource recovery into consideration by ensuring sufficient ***B.8 Space for Storage***, particularly for ***B.1 Making Around Courtyards*** where waste can be easily sorted or where businesses could exchange their waste. Thirdly, system interventions are required to engage city stakeholders and to create incentives to encourage stakeholders to re-use local material and energy flows. ***R.10 Place-based Financial Levers*** could also be activated. A ***R.3 Curator*** or area manager could help provide a matchmaking service between supply and demand of materials particularly where there is a strategy for ***N.3 Mixing Complementary Making and Related Services*** by curating systemic relationships between individual actors. Where no clear business model is available to manage waste, ***R.11 Incentives for Research & Development*** could be considered to build local innovation.

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N.3

MIXING COMPLEMENTARY MAKING & RELATED SERVICES

Mixing complementary manufacturing with related activities creates conditions for efficient work flows and provides opportunities for resource and knowledge synergies through cross-sectoral innovation.

Connected to:
R.2 / R.3 / R.6 / R.12 / N.4 / N.6 / B.1 / P.2 / P.7 / P.8

CIRCULARITY & TECHNOLOGY - NEIGHBOURHOOD/BLOCK

SOLUTIONS

Develop a complex manufacturing network by actively linking complementary business and services, facilitating exchanges of technology, creating synergies and collaborating on complex projects. Where possible nurture opportunities for industrial symbiosis and circular use of resources in line with ***N.2 Re-use of Materials and Energy Flows***. A local ***R.3 Curator*** or a trusted community leader is essential to represent general interests, help build relationships while learning about how businesses work and how they can be supported. Such a role is more likely to gain traction and relevance if grown out of the community's needs rather than subcontracted to a professional real estate agency. The curator could also help with matchmaking between businesses to share equipment, resources, space and personnel through ***P.2 Shared Technology & Making Spaces*** and with ***R.6 Sustainable Product Cycles***. The curator could be publicly financed (through taxes) or independently through business contributions. ***R.2 Transparent Making*** and a ***R.12 Material Database***, while challenging to enact, can be a helpful means of communicating how complementary making and related services interact. Informal relationships can be built through spatial interactions such as a ***B.1 Making Around Courtyards*** or a ***P.8 Community Hub in Making Locations***. Communities of makers can pool needs such as a ***N.6 Centralised Logistics Zone*** and ***P.7 Spaces for Development & Education***.

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N.4

CLUSTERING SIMILAR MAKING

Clustering similar types of manufacturing promotes conditions for innovation, competition and collaboration while increasing access to staff and concentrating associated environmental issues.

Connected to:
R.3 / R.6 / R.8 / C.1 / C.2 / C.5 / C.6 / C.7 / C.8 / C.9 / C.10
N.1 / N.2 / N.3 / N.5 / N.6 / N.7 N.8 / N.9 / B.3 / P.7 / P.8

URBAN INTEGRATION – NEIGHBOURHOOD / BLOCK

SOLUTIONS

Develop clusters of similar makers to take advantage of specialist knowledge and skill. Concentrating similar types of making can be structured by ***C.1 Microzoning*** and facilitated by a ***R.3 Curator,*** encouraging similar manufacturers to locate nearby. ***C.2 Negotiated Qualities & Environmental Criteria*** can be used to minimise or concentrate nuisances. Providing ***C.5 Varying Unit Sizes*** ensures businesses occupy the space they need and move to a site nearby if their needs change. The concentration of similar making is best kept to the scale of one or a few urban blocks and embedded in a larger area ***N.3 Mixing Complementary Making & Related Services***. ***R.11 Incentives for Research & Development*** and ***P.7 Spaces for Development & Education*** could provide companies with the possibility of sharing technology and encourage them to co-locate. Clusters can support the investment in a ***N.6 Centralised Logistics Zone*** and if planned well be located near ***C.7 Links to Transport Infrastructure***, therefore ***R.8 Moving Things Efficiently***. Planners could be ***N.1 Taking Advantage of Place Conditions*** by ***C.9 Concentrating Messy Making Along Infrastructure***, such as ports and waterfront for transportation. Clustering similar making brings advantages in transition towards more circular environments. Clusters can integrate ***N.5 Local Collection Points of Segregated Waste*** and ***C.8 Accessible Material Recovery Facilities*** that enable ***N.2 Re-use of Materials & Energy Flows*** and thus achieve ***R.6 Sustainable Product Cycles***. A ***P.8 Community Hub in Making Locations*** located at the edges of manufacturing clusters can be used to link companies with surrounding residents, contributing therefore to acceptance of manufacturing by the general public. As clusters often involve similar land uses, ***C.10 Transition Zones*** could help increasing mixed use activity, where a more ***B.3 Public Face*** promotes ***N.8 Quality Urban Environment in Making Areas***.

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N.5

LOCAL COLLECTION POINTS OF SEGREGATED WASTE

To ensure full recovery of waste streams, non-domestic waste collection points must be both easily accessible and well distributed across the city, into segregated waste streams to guarantee homogeneity, purity and maximise value and recovery potential.

Connected to:
R.3 / R.6 / R.7 / R.8 / R.10 / R.11 / C.2 / C.7 / C.8 / N.2
N.10 / P.6

CIRCULARITY & TECHNOLOGY - NEIGHBOURHOOD/BLOCK

SOLUTIONS

Provide practical solutions for managing waste that are easy for businesses to use without resulting in an unnecessary burden or cost. Local segregated waste collection points could help to reduce occupying yard spaces. It also helps sorting waste to retain purity and reaching adequate scale for viable recovery options. This will require defining how to move waste from the business to the collection point and if this burden is the responsibility of the manufacturer or the public authority. Local collection points need to be distributed across manufacturing districts at a distance of around 2km radius from the company to reduce congestion and cost for businesses. In well defined industrial areas undergoing regeneration, define the location of critical local waste collection infrastructure at the planning stage. The space required will depend on the number of neighbouring activities and their waste streams. For example, an area with a large furniture sector would need to have collection points of wood and wood derived products. It is important that areas are adequately monitored to avoid issues of fly-tipping (dumping waste on the site of the road) and cross-contamination, something which can be done using sensor and robotic technologies. The ***R.3 Curator*** could be instrumental in facilitating exploitation of recovered waste, which may include developing of collaboration for local testing and developing facilities but also identifying gaps in available ***R.7 Multi-scalar Circular Infrastructure***. ***R.10 Place-based Financial Levers*** can be used for training while fines given for miss-use. Innovation can be driven around new uses of waste through ***R.11 Incentives for Research and Development***, supported with start-up and incubating programmes.

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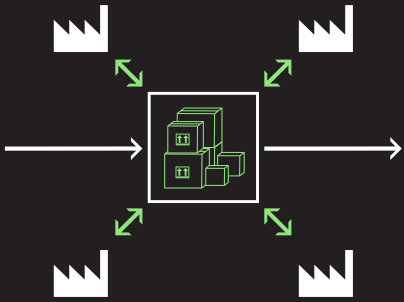

CENTRALISED LOGISTICS ZONE

Central collective logistics space in accessible locations facilitates efficient delivery and discharge of goods while providing opportunities to store material or manufactured goods.

Connected to:
R.7 / R.8 / C.1 / C.7 / N.5 / B.2 / B.8

CIRCULARITY & TECHNOLOGY - NEIGHBOURHOOD/BLOCK

SOLUTIONS

Create a centralised logistics zone to reduce manufacturers' needs for idle storage while encouraging more efficient movement of goods and resources. A city may have a plan for ***R.8 Moving Things Efficiently***, which is in their own interest to combat the rise of congestion through logistics vehicles and dealing with air pollution issues. Centralising logistics is a practical way of shifting mobility to smaller and cleaner vehicles. This needs to be considered in the context of ***C.7 Links to Transport Infrastructure***, offering opportunities to reduce reliance on road transport to more efficient and environmentally adequate options, including the use of train, trams, canals and waterways. Electric and alternative vehicles (such as bikes) may be considered for inner city deliveries, ensuring low emissions and flexibility avoid getting caught in traffic. Storage often can be combined with other quieter land uses if congestion and noise are well managed (for example with a ***B.2 Yard for Logistics***). If well considered within a master plan to avoid unnecessary conflict (a ***C.1 Microzoning***), logistics can be easily combined with housing or commercial activities. ***N.5 Local Collection Points of Segregated Waste*** and ***R.7 Multi-scalar Circular Infrastructure*** can be used to bundle logistics with circularity, where logistic centres can also act as reservoirs of used resources and materials. Public authorities interested in centralised logistics zones will likely require strong centralised planning tools and top-down application to avoid double handling goods and creating unnecessary congestion with smaller vehicles.

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N.7

LOCAL DESIGN & PROTOTYPING

Locating R&D testing facilities for manufacturing within knowledge hubs such as technology parks, innovation districts, and research centres promotes synergies in the use of technology and transfer of knowledge.

Connected to:
R.3 / R.10 / R.11 / C.3 / C.5 / N.3 / N.4 / P.4 / P.8

CIRCULARITY & TECHNOLOGY - NEIGHBOURHOOD/BLOCK

SOLUTIONS

Use planning and regeneration projects to embed testing and product prototyping, by connecting knowledge and research activities with design and manufacturing. Universities and research centres can be integrated manufacturing areas, providing businesses with opportunities for applied research and access to facilities and technologies (such as testing labs, emerging technologies, etc). Focus on ***N.3 Mixing Complementary Making & Related Services*** or/and ***N.4 Clustering Similar Making***. To ensure this will occur, it is necessary to provide space, incentives and conditions for interaction. Use ***R.11 Incentives for Research & Development***. In addition, a district with ***C.5 Varying Plot Sizes*** will help create diversity, essential for research and development. ***C.3 Balance between Public & Private Land*** may be necessary for influencing who occupies a district. Opportunities for ***P.4 Meanwhile spaces and Transitional Uses*** help providing low-cost space for start-ups to spin out. Incentives such as ***R.10 Place-based Financial Levers*** can be used to stimulate projects or building owners to align with neighbourhood scale ambitions. Finally a ***P.8 Community Hub in Making Locations*** can be necessary to spark ideas and grow informal relationships, while a ***R.3 Curator*** can be vital to nurture relationships and build a community.

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N.8

QUALITY URBAN ENVIRONMENT IN MAKING AREAS

A high quality public realm is attractive for both employees and clients, increasing a sense of safety, encouraging mixed use, improving staff retention and encouraging visitors.

Connected to:
R.1 / R.2 / R.3 / R.5 / R.8 / R.10 / C.1 / C.2 / C.3 / C.4 / C.5
C.6 / N.1 / N.5 / N.6 / N.9 / N.10 N.11 / B.1 / B.2 / B.3
B.6 / P.8

URBAN INTEGRATION – NEIGHBOURHOOD / BLOCK

SOLUTIONS

Ensure that environments for making are also attractive and comfortable for a broad range of daily users and visitors. ***C.6 Strategic Access to Multimodal Mobility*** could promote a modal shift in commuting, making it possible to redesign industrial areas, from vehicle-oriented to people-oriented environments with protected pedestrian and cycle spaces. These spaces should not affect truck turning circles or impact the capacity for vehicles to load and unload on streetscapes if that is the custom. Solutions could come down to reorganising the production process. A ***N.6 Centralised Logistics Zone***, organising ***B.1 Making Around Courtyards***, making on the ***N.11 Back of the High Street***, promoting ***B.2 Yard for Logistics***, ensuring waste is taken directly to ***N.5 Local Collection Points of Segregated Waste*** could relieve industrial streetscapes of their typical disorder and impact from heavy logistics vehicles. ***C.4 Diverse Tenure Models*** should be in place before any serious works are done to avoid unnecessary gentrification. This can include public investment to have a ***C.3 Balance Between Public & Private Land***. Manufacturing and logistics space with an existing or a potential thoroughfare could look inwards with a ***B.2 Yard for Logistics***. A ***B.3 Public Face*** could help reduce the barriers between businesses and the street while providing passive social control. Buildings should also be built along the front boundary to create a clear public streetscape while pushing parking, storage and logistics to the middle or back of the lot. Finally social functions, such as a ***P.8 Community Hub in Making Locations*** could also help attract the circulation of people, particularly outside of working hours. Key here is that such social functions address the needs, wishes, and expectations of all workers, skilled and low-skilled, with an accent on diversity of gender, race and class.

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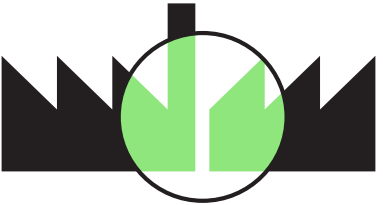
N.9



MAKING TOUCHES MAKING

Locating businesses according to similar environmental issues helps to minimise negative impacts of manufacturing by focusing on the block (noise and dust), streets (logistics) or neighbourhood (odours).

Connected to:
R.3 / C.1 / C.2 / C.9 / C.10 / N.1 / N.3 / N.4 / N.8 / N.11
B.1 / B.5

URBAN INTEGRATION – NEIGHBOURHOOD / BLOCK

SOLUTIONS

Concentrate similar types of makers along a street or block in order to minimise impact on neighbours. For new development areas, ***C1 Microzoning*** can be used to structure activities in specific zones using a master plan or vision document. For existing areas, ***R.2 Transparent Making*** and ***C.2 Negotiated Qualities & Environmental Criteria***, mediated with a ***R3 Curator*** can help reduce friction between manufacturers and residents. Manufacturing activities creating nuisances can be located in areas where such nuisances are tolerated. Making touches making is most effectively channelled along a street, but also in the back of industrial plots, at the scale of the block. ***N.3 Mixing Complementary Making & Related Services*** is one option to create a buffer between making and housing particularly for noise attenuation within ***C.10 Transition Zones.*** Making touches making works well by ***C.9 Concentrating Messy Making Along Infrastructure***, and ***N.1 Taking Advantage of Place Conditions,*** developing along transport infrastructure, using topographic height differences to buffer noise or mixed with other compatible land uses. Cluster ***B.1 Making Around Courtyards*** inside blocks, by ***B5 Enabling Vertical Making*** and organising logistics access via an entrance on a service street, (such as the ***N.11 Back of the High Street***). If planned properly, making touches making can result in ***N.8 Quality Urban Environment in Making Areas*** that do not result in conflict with manufacturing activities. It is important to keep some mix to ensure that streets remain active after typical working hours which could include sporting facilities or a cafe.

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N.10

MAKING ALONG HIGH STREETS

Concentrations of mixed-use activities along high streets can take advantage of the best regional accessibility and the highest amount of pedestrian flows, enhancing visibility.

Connected to:
R.3 / R.4 / C.2 / C.3 / C.4 / C.7 / N.1 / N.3 / N.5 / N.8 / N.11
P.5 / P.6 / P.7 / P.8

URBAN INTEGRATION – NEIGHBOURHOOD / BLOCK

SOLUTIONS

Where opportunities are available to be located on high streets, ensure that the local manufacturing is used advantageously while avoiding nuisances that affect neighbouring retail or commercial businesses. This can be mutually beneficial for retail, that can use the spectacle of artisans and manufacturing. A ***R.3 Curator*** can play a key role when integrating manufacturing in high streets, through ***C.2 Negotiated Qualities & Environmental Criteria*** to provide opportunities for dialogue and exchange amongst all actors concerned with activities along high streets (sometimes the responsibility of a local chamber of commerce). ***C.4 Diverse Tenure Models*** can help provide space along high streets. Likewise a ***C.3 Balance between Public & Private Land*** ensures that alternative land uses can occur and build diversity, particularly where land prices prohibit suitable diversity to occur. Retail oriented high streets, particularly where land is affordable, could provide space for crafts and artisans to be located above shops (such as the ***P.5 The Work Home***) or in the ***N.11 Back of the High Street***. Furthermore, while retail and services have traditionally grown together, diversity could be improved by ***N.3 Mixing Complementary Making & Related Services.*** Opportunities could be made for integrating ***N.5 Local Collection Points of Segregated Waste***, ***P.6 Re-use & Repair Centres***. Due to accessibility, high streets can be a good place for people of different backgrounds and cultures to meet, to accommodate ***P.7 Spaces for Development & Education*** as well as ***P.8 Community Hub for Making Locations***. Finally, a change in legislation may be a precondition to allow new functions (such as light manufacturing) in areas zoned for retail.

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N.11

BACK OF THE HIGH STREET

Locating manufacturing behind high streets, facilitates the movement of goods, provides flexible space for making, while located in proximity to complementary activities such as logistics, material suppliers and repair centres.

Connected to:
R.8 / C.1 / C.5 / C.7 / C.10 / N.10 / B.1 / B.5 / B.6 / B.9

URBAN INTEGRATION – NEIGHBOURHOOD / BLOCK

SOLUTIONS

Where suitable, locate manufacturing behind high streets, to draw on networks of retail and services businesses. As high streets lose their retail value to online shopping, ***N.10 Making Along High Streets***, such as artisanal workshops and light manufacturing is considered an attractive alternative. To best accommodate manufacturing, focus on bigger buildings with zones for ***B.6 Easy Loading & Unloading*** and continuous floorspace. This provides opportunities to concentrate wholesale, repair, logistics and manufacturing, all of which can be linked to complementary retail activities on the high street. Spaces with ***C.5 Varying Unit Sizes*** allow for a mix of makers. The back of the high street, with lower pedestrian flows and lower retail value should take advantage of ***C.7 Links to Transport Infrastructure***, allowing for the movement of goods and larger vehicles without affecting the volumes of traffic on the high street. This requires suitable infrastructure for ***R.8 Moving Things Efficiently*** such as loading bays. ***C.1 Microzoning*** can be applied to provide exceptions for deliveries in streets behind high streets, since in many mixed use areas, loading might be restricted. Where space permits, co-location (housing above manufacturing space) can be developed with Shared Yards for Logistics and ***B.1 Making Around Courtyards***. Consider also ***C.10 Transition Zones*** on the smaller scale and facilitate horizontal and vertical industrial intensification in mixed use areas and support the development of ***N.10 Making Along High Streets***.

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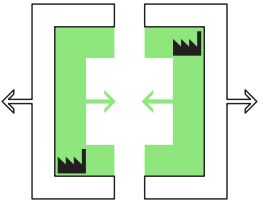

MAKING AROUND COURTYARDS

Organising manufacturing around courtyards inside blocks allows businesses to make noise, dust, move vehicles safely and provides additional space outside of the workshop area while allowing cohabitation with some forms of mixed use.

Connected to:
C.10 / B.2 / B.4 / B.6 / B.8 / N.1 / N.2 / N.4 / N.6 / N.10
N.11 / P.8

URBAN INTEGRATION - BLOCK/BUILDING

SOLUTIONS

Build manufacturing around courtyards to encourage informal relationships between makers, to create a buffer space for space consuming tasks and to reduce the impact of nuisances on neighbours. Making around courtyards should include a clear entry and exit for both security and safety. The courtyard can come in a range of sizes, which will depend on the kind of activities that will occur in the yard, the cost of land and requirement for logistics. If possible, allow space for vehicles to turn in the yard, or a thoroughfare to the back of the building allowing for a ***B.2 Yard for Logistics*** and ***B.6 Easy Loading & Unloading***. A lane in between yards can be useful for logistics. Making around courtyards can be combined with multi-storey industrial intensification facilities so long as there is a suitable goods lift or ramp (***B.5 Enabling Vertical Making***). Good acoustic insulation and structurally detached units are key to avoid noise and vertical vibrations transmitted towards co-located dwellings. In high density areas the courtyards could be covered by roofs, minimising the exposure to noise and dust. In co-location projects, one or more units could be dedicated to the residents of the block, which would give an added value for the neighbourhood. Making around courtyards can be ideally combined with ***P.2 Shared Technology & Making Spaces*** to help share costs. To strengthen the position of manufacturing activities around courtyards, co-location projects could benefit from a ***R.3 Curator*** or being owned by a public actor, providing a ***C.3 Balance between Public & Private Land***.

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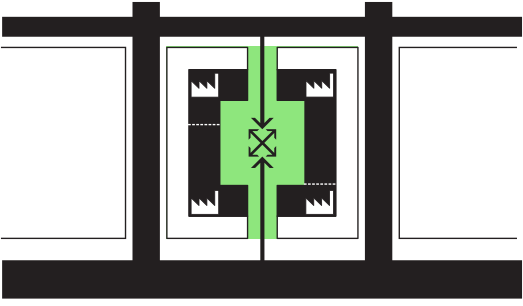

YARD FOR LOGISTICS

Yards with sufficient space for turning and parking can facilitate safe loading and unloading, without disruption, in high density areas.

Connected to:
R.3 / R.8 / C.1 / N.5 / N.6 / N.8 / N.9 / N.11 / B.1 / B.4
B.5 / B.6

URBAN INTEGRATION - BLOCK/BUILDING

SOLUTIONS

Located manufacturing and manufacturers around yards to reduce logistics issues in public spaces while making logistics safer and more efficient. The yard for logistics is best combined with other infrastructure, such as a dock for ***B.6 Easy Loading & Unloading***, a direct link into the main production space(s) for ***B.4 Facilitating Horizontal Organisation***, connection to the goods lift for ***B.5 Enabling Vertical Making, B.8 Space for Storage*** or infrastructure for dealing with waste streams to simplify sorting at the ***N.5 Local Collection Points for Segregated Waste***. A yard for logistics can be a multifunctional space. Organising ***B.1 Making Around Courtyards***, shared among many businesses, reduces the impact of logistics on the urban environment to a clear entry point which helps also to limit public access. For larger development projects, particularly when dealing with ***C.1 Microzoning***, courtyards may be covered (for noise reasons) and can have a clear entry and exit which reduces the need for large turning space - 6-8 meter widths rather than 30-35 meters. Also, in certain conditions, on the ***N.11 Back of the High Street*** or where ***N.9 Making Touches Making***, roads can be dedicated to manufacturing, allowing for shared for logistics spaces. The use of smaller vehicles, for ***R.8 Moving Things Efficiently,*** could can be beneficial if combined with ***N.6 Centralised Logistics Zone***. Shared yards in small buildings can be managed informally by the respective business. But in large buildings with many uses a ***R.3 Curator*** (or building caretaker) is necessary to keep order and provide support for use of common spaces.

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B.3

PUBLIC FACE

Activities which have a public interface achieve better neighbourhood integration and acceptance, while improving exposure to clients.

Connected to:
R.1 / R.2 / C.1 / N.3 / N.8 / N.10 / B.9 / P.2 / P.3 / P.6
P.7 / P.8

URBAN INTEGRATION - BLOCK/BUILDING

SOLUTIONS

Improve the relationship between manufacturers and the general public through a public facing facade. Before doing so, the business should have very clear ambitions for what it aims to gain from increasing the link to the street. The level of interaction with the street should relate to the business' values and the relationships it aims to build with their clients and the surrounding neighbourhood. Businesses with products requiring high levels of public trust, like food, can enforce this relationship with a public facade. A businesses such as a pharmaceutical company that requires high levels of security may simply offer signage. Achieving ***R.2 Transparent Manufacturing*** and ***R.1 Making Making Visible*** can be strengthen by a public face, and should be embedded in design regulations such as ***C.1 Microzoning***. These rules should guide the interaction between the street, the community, and the manufacturing processes including windows, shopfronts and public entrances. Smaller manufacturers and other professionals may also have shared premises, such as a ***P.8 Community Hub in Making Locations*** that can also be accessible by the local community. Manufacturing activities with a public face could also include well accessible ***P.7 Spaces for Development & Education***, especially when they are ***N.10 Making Along High Streets.*** The physical public face could be complemented open days and tours which may also offer an alternative revenue stream through tourism (see ***R.1 Making Making Visible***).

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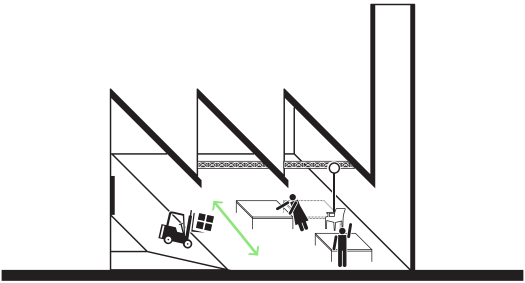
B.4



FACILITATING HORIZONTAL ORGANISATION

Horizontal organisation of manufacturing spaces, including smooth floors, overhead gantries and wide spacing between columns enables easy reconfiguration and safer working conditions.

Connected to:
R.5 / R.8 / R.10 / B.5 / B.6 / B.7 / B.8 / B.9 / P.4

URBAN INTEGRATION - BLOCK/BUILDING

SOLUTIONS

Provide horizontal spaces that are as flat as possible with a limited number of columns or partitions to facilitate movement of goods and production processes. When designing or refurbishing spaces for manufacturing, preference should be given for: smooth flooring, soft ramps instead of steps (max 12%), ***B.9 Large Openings*** and goods docks for ***B.6 Easy Loading and Unloading***, wide roof spans for the sake of flexibility, workstations on casters, overhead gantries. ***B.7 Access to Technical Networks and Services*** should avoid cables laying on the ground to avoid trip hazards. Ramps and a gentle slope are required to overcome existing differences in grade. Paint columns with colours and patterns to make them more visible, particularly for older buildings. ***R.10 Place-based Financial Levers*** can support renovations and make spaces safer and adaptable. Increasingly, ***B.8 Space for Storage*** can involve using robots or computer programmed horizontal and vertical storage to get the most out of space and move goods around efficiently. For co-location or industrial intensification projects, developers must build to minimum floor loadings and column spacings, to ensure buildings are flexible and adaptable. These solutions should be taken into account for each floor when ***B.5 Enabling Vertical Making***.

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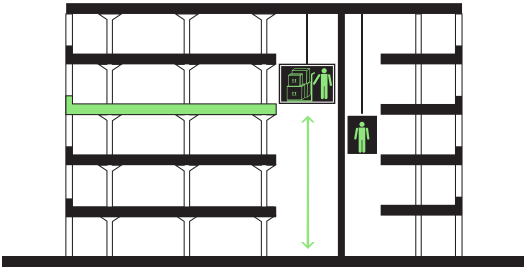
B.5



ENABLING VERTICAL MAKING

Goods lifts and heavy load-bearing floors in multi-storey buildings allow for industrial intensification and for buildings to adapt according to demand for space.

Connected to:
R.5 / R.8 / R.10 / C.1 / C.2 / C.10 / N.3 / N.9 / N.11 / B.2
B.4 / B.6 / B.7 / B.9 / P.5

URBAN INTEGRATION - BLOCK/BUILDING

SOLUTIONS

Where manufacturing occurs on numerous levels, ensure that accessibility (lifts), stability (floor loading), fire protection and interfaces between production and non production spaces do not limit the potential for manufacturing while allowing free and efficient circulation. Technical aspects of vertical making should be carefully considered when developing master plans such as through ***C.10 Transition Zones***, ***N.3 Mixing Complementary Making & Related Services*** and ***C.1 Microzoning*** to avoid nuisances and tension between land uses. This includes locations for logistics (***B.6 Easy Loading & Unloading***) and concentration of similar kinds of makers (***N.9 Making Touches Making***). For new buildings to host vertical manufacturing, they must offer goods lifts: preferably two or more to account for redundancy, large enough to take a pallet and pallet trolley or forklift, separating flows of people and materials. Provide ***B.9 Large Openings*** in combination with lift systems facing the ***N.11 Back of the High Street*** or ***B.2 Yards for Logistics*** for large and cumbersome objects. Provide suitable ***B.7 Access to Technical Networks & Services*** such as ventilation, water pressure and voltage. Include strong load-bearing structures, and flexible floor plans for ***B.4 Facilitating Horizontal Organisation*** of production. Provide suitable fire escapes and a range of exits. In the case of mixed-use buildings, separating structural systems for different functions can avoid transmission of vibrations. ***C.1 Microzoning*** and ***R.10 Place-based Financial Levers*** can help solve financial and legislative constraints linked with mixing manufacturing with other uses, installing a goods lift, refurbishing buildings while complying with ***C.2 Negotiated Qualities & Environmental Criteria.***

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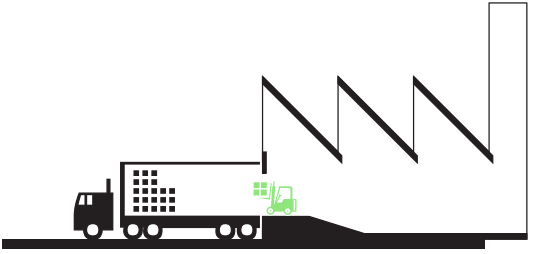

EASY LOADING & UNLOADING

Loading docks, ramps and dedicated parking bays are essential to allow for a smooth transition of goods in and out of vehicles.

Connected to:
R.5 / R.8 / N.6 / N.8 / N.9 / N.10 / N.11 / B.2 / B.3 / B.4
B.5 / B.9

URBAN INTEGRATION - BLOCK/BUILDING

SOLUTIONS

Ensure that loading bays provide efficient and safe infrastructure for transferring goods between vehicles and buildings. Provide direct access from vehicles to shop floors, storage rooms, or goods lifts (***B.5 Enabling Vertical Making***) to avoid interrupting the manufacturing process. Most effective docks will be equipped with features such as dock levellers to access the vehicle cargo deck (semi-trailers (over 1m high) and vans (0.5m)), bumpers to protect the vehicle and dock from damage and a dock seal to protect the goods from the elements. Besides the dock itself, a ramp (max 12%) from the loading dock down to the truck parking area facilitates accessing goods from small vans and from the sides of trucks. When a permanent loading space cannot be installed or is simply not flexible enough, a mobile version, often called a 'yard ramp', can be used. Parking space for large trucks should also be considered, particularly where drivers need break or when waiting for goods to be loaded. Spaces should be considered for the largest vehicle that will regularly service a site: a 15-20 metre semi-trailer is around 2.6m wide and 4.2m tall, requiring a 30-35m turning circle. Logistics is one of the most common conflicts between residents and manufacturers in mixed-use neighbourhoods. Logistics spaces are generally practical but if located next public space, they can result in voids and a poor ***N.8 Quality Urban Environment in Making Areas***. Messy logistics spaces can be perceived as dangerous, particularly at night. Therefore ***B.2 Yards for Logistics*** are useful, particularly for shifting noise and dangerous vehicles away from the general public (see ***N.11 Back of the High Street*** and ***N.9 Making Touches Making***). Cargo docks and vertical circulation (such as goods lifts or ***B.9 Large Openings***) are best located in yards or behinds gates. A ***N.6 Centralised Logistics Zone*** can help minimise large vehicles entering into city centres.

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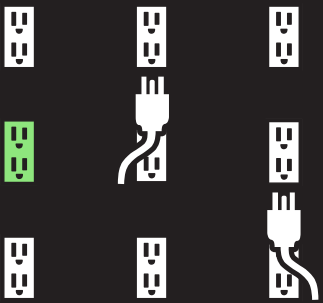

ACCESS TO TECHNICAL NETWORKS & SERVICES

Well-distributed and adequate capacity of technical networks (electricity, water, ventilation, communications and distribution channels) allows for flexible, responsive and distributed manufacturing.

Connected to:
R.3 / R.6 / R.7 / R.10 / C.1 / N.2 / N.3 / P.4

CIRCULARITY & TECHNOLOGY – BLOCK/BUILDING

SOLUTIONS

Ensure that technical networks, at both the neighbourhood and building scale, are suitable or do not limit a business' potential. Competitivity can be dependent on available volumes of energy, water and other resources which are supplied through networks. At a neighbourhood scale, supply can be subject to the capacity shared infrastructure and the price of distributing resources. This will depend on local conditions (access to resources) and/or public investment in infrastructure. If there is a need for improved technical networks at a neighbourhood scale, businesses will need to build a case for public or private investment. A neighbourhood ***R.3 Curator*** could be engaged to learn about the infrastructure needs of local businesses to communicate with network providers. Doing so will provide opportunities for ***R6 Sustainable Product Cycles***, ***N.2 Re-use of Material & Energy Flows***, support ***R.7 Multi-scalar Circular Infrastructure*** and contribute to rich manufacturing environments through ***N.3 Mixing Complementary Making & Related Services***. At a building scale, technical networks can limit production and can be costly to update. Buildings subject to ***P.4 Meanwhile Spaces & Transitional Uses*** will require an evaluation of the capacities of the technical networks (particularly for fire safety) to avoid unnecessary costs or stalling short-term activities. In general it is important that technical networks are designed for flexibility and redundancy to accommodate new technologies, new forms of energy (such as renewables), energy efficiency options, water saving, heat cascading technologies as well as optimised collective use of heat and steam (such as a CHP) and ***R.7 Multi-scalar Circular Infrastructure***. In an age of distributed manufacturing and greater levels of automation, access to fast and reliable communication networks is equally fundamental. Serious changes may require ***C.1 Microzoning*** and ***R.10 Place-based Financial Levers.***

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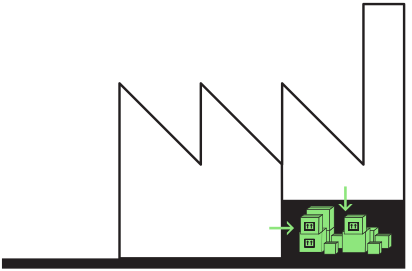

SPACE FOR STORAGE

Manufacturing spaces with smart storage solutions allow for efficient use of space and production processes.

Connected to:
R.6 / R.7 / R.8 / R.12 / C.8 / N.5 / N.6 / P.2

URBAN INTEGRATION - BLOCK/BUILDING

SOLUTIONS

Ensure that practical and compact solutions for dealing with storage or materials and waste. This allows businesses to manage demand, to have a buffer of materials and to sort waste streams. Solutions such as shared storage space, or using marketplaces to share/sell waste materials, are ways to help manufacturers in solving the issue of storage. Decentralising storage space could be a solution, when coupled with mobility strategies to avoid congestion. Solutions could include a ***N.6 Centralised Logistics Zone*** that facilitates ***R.8 Moving Things Efficiently*** at the scale of a neighbourhood. Digital solutions could facilitate the most efficient and least disturbing movement of materials and stocks for just-in-time production. A ***R.12 Material Database*** and ***C.8 Accessible Material Recovery Facilities*** would be needed to achieve circularity and avoid having idle waste materials useful for others. Businesses in ***P.2 Shared Technology & Making Spaces*** need to find clever ways to avoid storage from consuming useful shared production spaces. Affordable low-tech vertical storage systems can use crate sized boxes lifted by forklifts onto heavy-duty shelving, while more automated systems are emerging within the competitive logistics sector.

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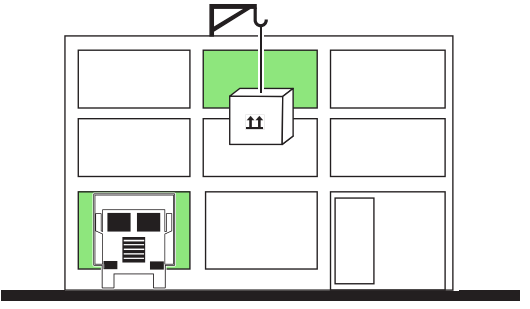
B.9



LARGE OPENINGS

Large openings in buildings enable vertical and horizontal accessibility to access goods, materials and large equipment.

Connected to:
R.8 / C.1 / C.2 / N.9 / N.11 / B.2 / B.3 / B.5 / B.6 / P.2
P.3 / P.5

URBAN INTEGRATION - BLOCK/BUILDING

SOLUTIONS

Build large openings into buildings to provide flexibility and resilience for future use. New projects should include a range of technical solutions that allow bulky things to move in and out of buildings, through doors and windows with lifting gantries or cranes. This is complementary to ***B.5 Enabling Vertical Making*** in co-location or in industrial intensification projects. Openings (such as doors and gates) should be at least wide enough to allow the passage of a standard European pallet (1200 mm x 800 mm) otherwise a ceiling to floor height opening is ideal. ***C.1 Microzoning*** could provide planning exceptions, if citywide codes impose limitations on the size of openings or materials in buildings. If manufacturing activities require a ***B.3 Public Face***, large openings can be located out of sight on the ***N.11 Back of the High Street***, in streets where ***N.9 Making Touches Making***, or in a ***B.2 Yards for Logistics.*** Group buildings with exceptionally large openings, in order to safely lift heavy and bulky objects, and help businesses ***R.8 Moving Things Efficiently***. Large windows can help ***B.5 Enabling Vertical Making*** or ***P.5 The Work Home***.

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P.1

PRODUCTIVE ROOFTOPS

Roofs complement the performance of a building or intensifying land use, allowing for climate adaptation, food and energy production.

Connected to:
R.7 / R.10 / R.11 / N.3 / N.8 / B.3 / B.5 / B.7 / P.7

URBAN INTEGRATION - BLOCK/BUILDING

SOLUTIONS

Provide suitable infrastructure and roof access to ensure that even roof spaces can be put to good use. New projects generally will be required by law to use the roof surfaces (such as for water management or energy production). If considered carefully, roofs can be used within the production process (to provide water, energy, use heat etc.). Critical issues need to be considered. First, whether the structure of the building is able to hold the additional weight. Secondly, the cost of installing a productive roof and define how investments may be recovered. Thirdly, determine the additional costs for maintenance, irrigation, fertilisation, and safe access. Fourth, calculate the trade-off of having natural light from skylights versus a functional roof. Finally, define the context (existing roof landscape, orientation) and related regulations that can limit the potential functions added to a roof. For areas with poorly used of rooftops, ***R.10 Place-based Financial Levers*** can support the installation of green or productive roofs, sedum gardens, greenhouses for agriculture and solar panels. Subsidies can both help adding the necessary ***B.7 Access to Technical Networks & Services*** (structural improvements, most importantly) for the new use, and also providing for maintenance. Solar panels may be seen as an investment to reduce energy costs and can be implemented by an energy cooperative that can become responsible to maintaining the technology. ***R.11 Incentives for Research & Development*** and ***B.5 Enabling Vertical Making*** could encourage new solutions or programmes for productive roofs. Urban farming could be used by staff to provide healthy and ***R.5 Fair Work Conditions***. For urban farming, ***N.3 Mixing Complementary Making & Related Services*** can be useful in terms of industrial symbiosis (for heat or resources), by having access to specialist knowledge and by having clients nearby.

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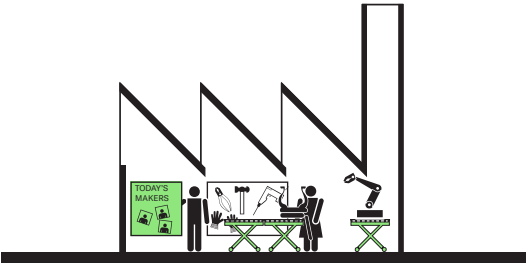

SHARED MAKING SPACES &TECHNOLOGY

Smart use of space and technology through sharing can increase accessibility to expensive equipment, make more effective use of technology, while encouraging knowledge transfer between manufacturers.

Connected to:
R.4 / R.6 / R.9 / R.11 / R.12 / C.4 / C.8 / N.2 / N.7 / B.2 / B.7
P.3 / P.6

URBAN INTEGRATION - NEIGHBOURHOOD/BLOCK

SOLUTIONS

Develop opportunities to share technology and space to improve efficiencies and reduce costs while sharing knowledge and skills. Start-ups, micro and small businesses particularly benefit from access to shared technology, production/manufacturing space, materials ***N.2 Re-use of Materials & Energy Flows*** and a ***B.2 Yard for Logistics***. Employing ***C.4 Diverse Tenure Models*** could take place in the form of a 'studio-workshop', see ***P.3 Flexible Spaces for Making***. This could be combined with access to technology labs and production areas. Cooperative ownership models and management could potentially foster more democratic foundations for shared making, depending less on big investors or single entrepreneurs for scaling up. Ecosystems of makers could be built off a ***R.12 Material Database*** or linked around ***C.8 Accessible Material Recovery Facilities*** to improve the circularity of materials. Larger and established manufacturers also have much to gain from renting out space or technology to smaller manufacturers, to get the most out of their assets while attracting younger talent or finding new approaches for collaboration. The potential to establish valuable links for the lateral transfer of know-how is very high. Old-fashioned technology rental companies remain useful, where technology is mobile and not needed on a regular basis.

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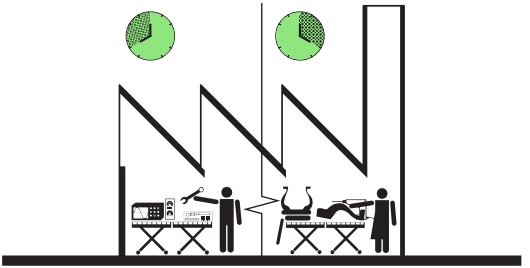

FLEXIBLE SPACES FOR MAKING

Multi-functional spaces accommodate different user needs over time, allowing for easy reconfiguration, growth, or shrinkage of manufacturing processes.

Connected to:
R.6 / R.9 / R.11 / C.3 / C.4 / C.5 / B.3 / B.4 / B.5 / B.7 / B.8
B.9 / P.2

URBAN INTEGRATION - PROGRAMME

SOLUTIONS

Provide flexibility in the design of spaces and buildings so manufacturing environments can be adapted to business' needs. At a district or block scale, ***C.5 Varying Plot Sizes*** (or buildings of different sizes or spaces) and ***C.4 Diverse Tenure Models*** can facilitate businesses to grow or contract within a particular location, particularly if they depend on location for suppliers or clients. A ***C.3 Balance Between Public & Private Land*** can be necessary to correct the market by providing spaces that are necessary for critical forms of manufacturing (such as food production or waste management). At the building level, flexibility could include: ample ***B.7 Access to Technical Services***, a design ***B.4 Facilitating Horizontal Organisation*** and ***B.5 Enabling Vertical Making***, ***B.9 Large Openings***, abundant ***B.8 Space for Storage & Logistics***, modular construction, moveable or easily removable partitions (such as doorways), building heights to allow spaces to include a mezzanine (at least 5-6m floor to ceiling height), the capacity to create a client facing ***B.3 Public Face*** for retail or a showroom and possibilities to create a 'box in the box' insulated workroom for design or administration. Rental contracts can be developed for businesses to have ***R.9 Assured Security of Space***, allowing them to subdivide or sublease space for ***P.2 Shared Technology & Making Spaces***.

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MEANWHILE SPACES & TRANSITIONAL USES

Meanwhile spaces can allow makers access to low-cost and low commitment access to space for making activities while also provide planners with a period to test new activities.

Connected to:
R.3 / R.10 / C.4 / C.5 / N.7 / B.7 / P.6 / P.7 / P.8

PEOPLE NETWORKS & POLICY - PROGRAMME

SOLUTIONS

Take advantage of empty buildings or spaces as an opportunity to test new ideas, create space for start-ups or provide a location for community oriented activities. Temporary use of spaces, buildings or sites can prioritise start-ups, ***N.7 Local Prototype & Design*** to get new ideas off the ground and test production processes. This can be done in conjunction with ***R.11 Incentives for Research & Development***. Temporary use can be seen as a community service vehicle and allow testing of activities that have a supporting role for a neighbourhood such as an ***P.8 Community Hub in Making Locations***, spaces for ***P.6 Re-use & Repair Centres*** and ***P.7 Spaces for Development and Education***. Likewise available space can be useful for businesses wanting to upscale, refer to ***C.4 Diverse Tenure Models***. Temporary should be not considered simply an ephemeral activity, filling in time between two other activities. Quite the contrary, the temporary activity should be considered as a transitional period to take risks and explore opportunities that could evolve into longer-term businesses, services or facilities. To activate temporary use, public authorities can use ***R.10 Place Based Financial Levers*** which either support owners to make their buildings available for temporary use, or fine those that leave their buildings vacant. Temporary use of spaces, buildings or sites could be facilitated by a ***R.3 Curator*** operating at the district scale who is capable of connecting the needs of owner and user. Call for proposals are a useful way to identify projects and select ones deemed compatible. The curator should stipulate the rental agreements to ensure both the building owner and the activity have some level of protection and security while understanding costs and charges. One important dimension involves clearly defining the minimum temporary use period so that the projects can make appropriate investments.

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THE WORK HOME

Homes can be a key part of local production processes and provide accessible and flexible income if domestic spaces and work-live concepts can be used for micro-manufacturing.

Connected to:
R.5 / R.6 / C.1 / C.2 / B.5 / B.7 / B.9 / P.8

URBAN INTEGRATION - BLOCK/BUILDING

SOLUTIONS

Provide choice and flexibility for small-scale makers, to work from home. City-wide regulation or ***C.1 Microzoning*** could allow residents to use a percentage of their residential floor area for economic activities, that include artisanal or highly customised forms of manufacturing. Activities performed at home can be diverse, such as speciality food production, bespoke clothing and niche electronics. Environmental impact should be performance based to ensure that there is flexibility in what can be made so long as neighbours are not affected by noise, odours or fire risks. Use ***C.2 Negotiated Qualities & Environmental Criteria*** and ***R.5 Fair Work Conditions*** as a guide. This way, the use of new, cleaner and more circular forms of making can be encouraged. Ultimately this could result in ***R.6 Sustainable Product Cycles***, particularly for high value resources. New urban intensification and mixed-use projects with work-live concepts should consider opportunities for working from home such as: ***B.5 Enabling Vertical Making*** (including a goods lift), ***B.7 Access to Technical Networks and Services***, ***B.9 Large Openings***, flexible apartment layout, and good noise insulation. A ***P.8 Community Hub in Making Locations*** where support for home-workers is provided, could facilitate knowledge exchange within networks of decentralised production, and offer a point of contact between entrepreneurs, employees, and residents to address issues of impact and labour conditions. A ***R.3 Curator*** can be an important figure to help connect these small manufacturers and share relevant knowledge on trends, regulation and collaboration opportunities.

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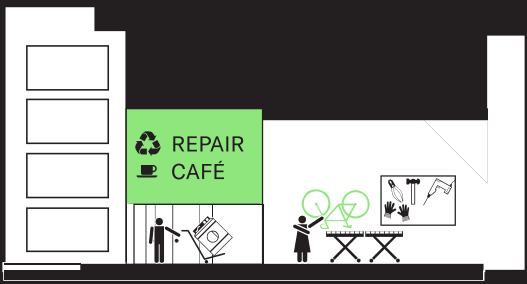

RE-USE & REPAIR CENTRES

A network of local exchange and repair centres encourages re-use and re-circulation of consumer and professional goods, providing opportunities for local employment and community building.

Connected to:
R.4 / R.5 / R.6 / R.10 / R.12 / C.1 / C.3 / C.4 / C.8 / C.10
N.2 / N.5 / N.10 / P.7

CIRCULARITY & TECHNOLOGY - PROGRAMME

SOLUTIONS

Distribute re-use and repair centres across the city to ensure they are close to consumers, easily accessible, to minimise waste and extend product life cycles. Providing affordable and accessible space for repair and re-use activities, such as ***N.10 Making Along High Streets***, can contribute to community building and ***P.7 Spaces for Development & Education*** connected to ***N.7 Local Design & Prototyping*** and result in ***R.6 Sustainable Product Cycles***. Incentives are needed to safeguard space for social enterprises such as ***C.4 Diverse Tenure Models*** or through a ***C.3 Balance between Public & Private Land***. They can also be supported through specific instruments such as tax-breaks, (such as charity shops selling second hand products or remanufactured products; or lower Value Added Tax for repaired products) to stimulate the market and increase their competitiveness as an alternative to cheap imported products. These could be accompanied by other policy incentives and ***R.10 Place Based Financial Levers*** to enhance social and environmental integration of these activities with the community. ***C.10 Transition Zones*** can also be suitable locations as they can benefit from both proximity to residential and commercial uses but also manufacturing activities where products and components can be further remanufactured. ***C.8 Accessible to Material Recovery Facilities*** can also be beneficial as a main source of pre-sorted disposed products that are suitable for upcycling through repair and remanufacturing. Similarly, ***N.5 Local Collection Points of Segregated Waste*** may supply materials/components and products for re-use and repair activities.

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SPACES FOR DEVELOPMENT & EDUCATION

Training centres are necessary to facilitate education, share knowledge and develop relevant skills.

Connected to:
R.1 / R.2 / R.3 / R.4 / R.5 / N.3 / N.4 / B.3 / P.2 / P.8

PEOPLE NETWORKS & POLICY - PROGRAMME

SOLUTIONS

Provide spaces for development and education to ensure that staff are suitably trained, workers have opportunities to expand knowledge and employees are capable of delivering high quality goods. To prepare for the ***R.4 Availability of Diverse Jobs***, there are three predominant training streams directly focused on manufacturing. Firstly low-skilled and repetitive jobs may need to adhere to certain standards including safety, hygiene, communications and possibly first aid. Such training could occur on-site or through an accredited training centre, especially within neighbourhoods ***N.3 Mixing Complementary Making & Related Services***. Secondly, skilled workers, those with extensive technical training such as electricians or bakers, require classic institutional education to accredit basic knowledge, while following a suitable (2-4 year) apprenticeship. To avoid using outdated machinery, equipment for education could be co-sponsored by industry groups to have access to the latest gear or by locating education in ***P.2 Shared Technology and Making Spaces***. Finally, pluri-disciplinary workers, those with both technical and tertiary education, can build skills through university technical labs or maker-spaces. Examples of advanced manufacturing centres exist that combine technical training (vocational training) and theoretical knowledge (universities) within neighbourhoods ***N.4 Clustering Similar Making***. Such spaces allow thinkers, makers and entrepreneurs to rub shoulders. Neighbourhood training spaces can be combined with a ***P.8 Community Hub in Making Locations*** while a ***R.3 Curator*** could help link available training with small and medium sized businesses. In addition, communication campaigns are needed to raise the profile of skills training programmes and centres that feed the manufacturing workforces, ***R.1 Making Making Visible*** is essential to draw interest in education.

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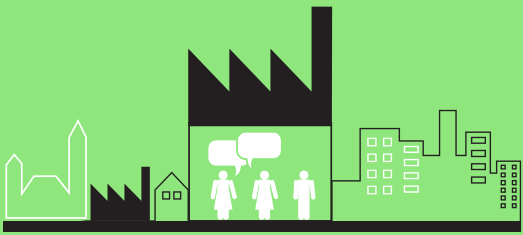

COMMUNITY HUB IN MAKING LOCATIONS

An inclusive hub helps facilitate knowledge exchange, nurture a place-based network of makers, encourage collaboration and provide businesses with a space to discuss collective problems and opportunities.

Connected to:
R.1 / R.3 / R.7 / R.10 / N.3 / N.4 / B.3 / P.2 / P.7

PEOPLE NETWORKS & POLICY - PROGRAMME

SOLUTIONS

Create a community hub to improve informal relationships between makers, while generating opportunities for innovation, skills development and business incubation. In some cases it will be a bar or restaurant. It could be a community centre or a cafe connected to a business development agency. It may also be a conference space or hotel. Regardless, the atmosphere of the space should be sufficiently inclusive to draw a wide range of actors at any time the day, irrespective of class, sex or background. The facility should be multi-functional and encourage users to visit the hub for various reasons - whether it be a meeting, attend an event, have lunch, look for a possible project partner or seek business support. A range of small and large spaces should be available where meetings and events can take place. There are three particular dimensions to address. Firstly, the purpose of the hub can be diverse, and could facilitate ***R.1 Making Making Visible***, supporting businesses in ***N.3 Mixing Complementary Making & Related Services***, ***N.4 Clustering Similar Making*** and/or even becoming ***P.7 Spaces for Development &Education***. Secondly, financing the hub will change from place to place. Some will start with public or private seed funding and then auto-finance through a restaurant or events. Public financing can be generated through ***R.10 Place Based Financial Levers*** such as taxes, cultural and research grants or business development financing. Finally, responsibility for the community hub is essential. It should be coordinated by a person or organisation with strong interpersonal skills that can facilitate events and connect individuals. A ***R.3 Curator*** or curatorial team could be actively involved in understanding the needs of the local businesses and develop relationships, host events, explore opportunities for ***P.2 Shared Technology & Making Spaces***, build ***R.7 Multi-scalar Circular Infrastructure*** and help convert informal relationships into business, new design and output.

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Connected to:

SOLUTIONS

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