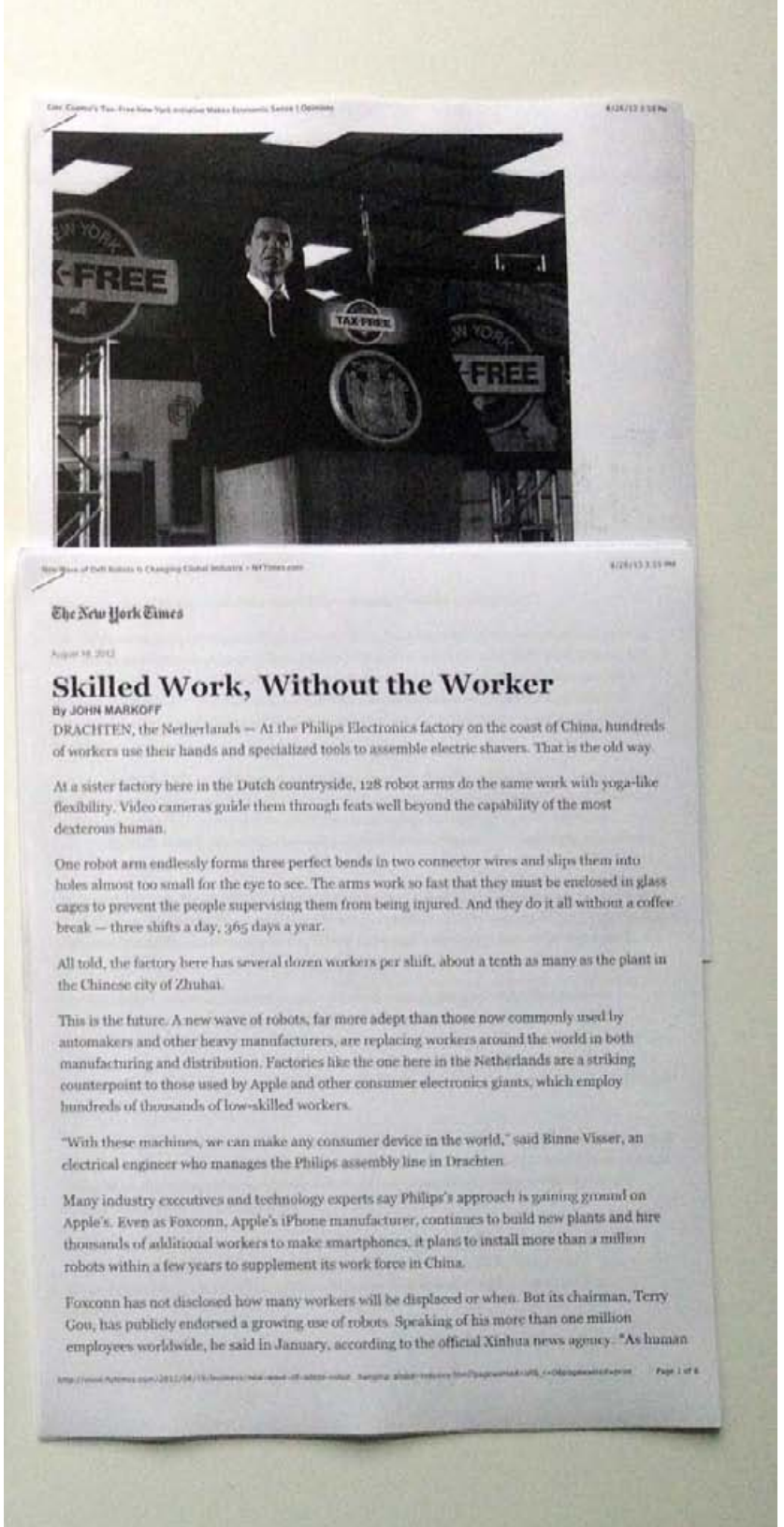
ARC 307: Third-Year Undergraduate Design Studio
Robot Factory: Production and Reproduction in the Post-Industrial City

Where Has Production Gone?

To be an architect in most cities of the developed “west” is to be confronted with various conditions of emptiness and to be charged with helping to fill this emptiness with, new, beautiful, “successful”, sustainable urban architecture. We are told that “jobs have moved overseas”, factories are converted into lofts, downtown business districts are “revitalized” by becoming places for consumption, and cities look to replace their blighted industrial districts with sport stadiums, casinos, and convention centers. Where planners had focused on feeding, housing and transporting workers now concern shifts to creating jobs, retaining tax base and even somewhat paradoxical efforts to “preserve” industrial uses as if they had some cultural value in excess of their economic one. Industry, work and the production of value are, of course, not gone. They have just disappeared, become more diffuse, complex and invisible.

Central to modernist urbanism is the conception of the “functional city” figured as an integrated system in which the “four functions” of industry, habitation, circulation and recreation relate to one another to create and sustain culture and provide their inhabitants with the comforts and freedoms of modern living. While industrial projects did not, for the most part, receive the same attention in modernist design practice as housing or public and cultural buildings, industry is the unequivocal basis of the modernist city, even to the extent that the linearity of Le Corbousier’s conception of the “linear city” takes it’s linearity from Henry Ford’s assembly line. As modernity has run its course in the developed world and the possibilities of “post-modern” society and “post-modernist” architecture have been explored, concepts of post-Fordist production have been posited to explain systems in which mass production and maximized efficiency are no longer the central organizers of industry and processes of symbol manipulation and affective labor become as important as material production.

This semester we will study ways that production takes place in the contemporary post-industrial context and consider its role in the reproduction of the social relations that define urban culture. We will design a mixed-use facility that combines the “four functions” into a single building by creating a “factory” (a specialized research and production facility) that builds robots (considered broadly as machines that operate autonomously in some way and that are designed to replace human workers in the tasks they perform). Our “robot factories” will also includes housing for workers or managers that will serve as a laboratory and showcase for the life that these machines hold out the promise of, and a public space through which the robots and their makers will interact with the larger urban community.



Phase 01: Ghosts and Machines

01.01 Robot Study

Select a company from the packets provided and research the products this company produces. Pick one or two of the most interesting or important robots produced by the company and draw it/them, to scale, in plan, elevation and axonometric. Include a human figure for scale. Specific information on the size and construction of your robot(s) maybe be incomplete, inaccessible, classified or a trade secret. Collect what data you can and project, extrapolate or speculatively imagine the rest.

Drawings should be black-and-white, hard lined in AutoCAD or Adobe Illustrator and be scaled to fit neatly onto a single 18”x24” sheet.

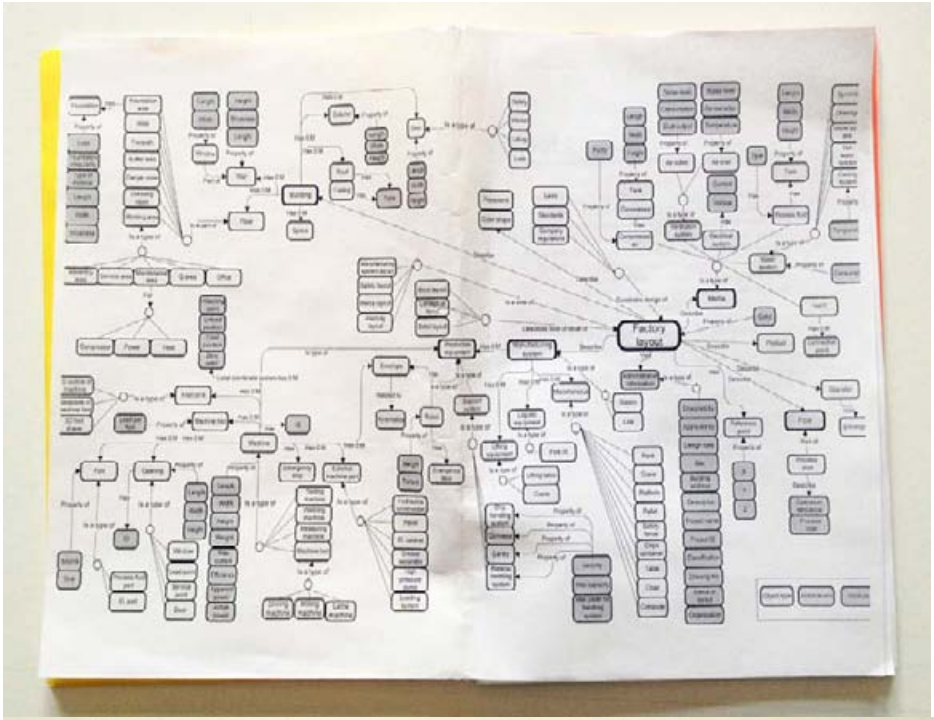
01.02 Four Diagrams

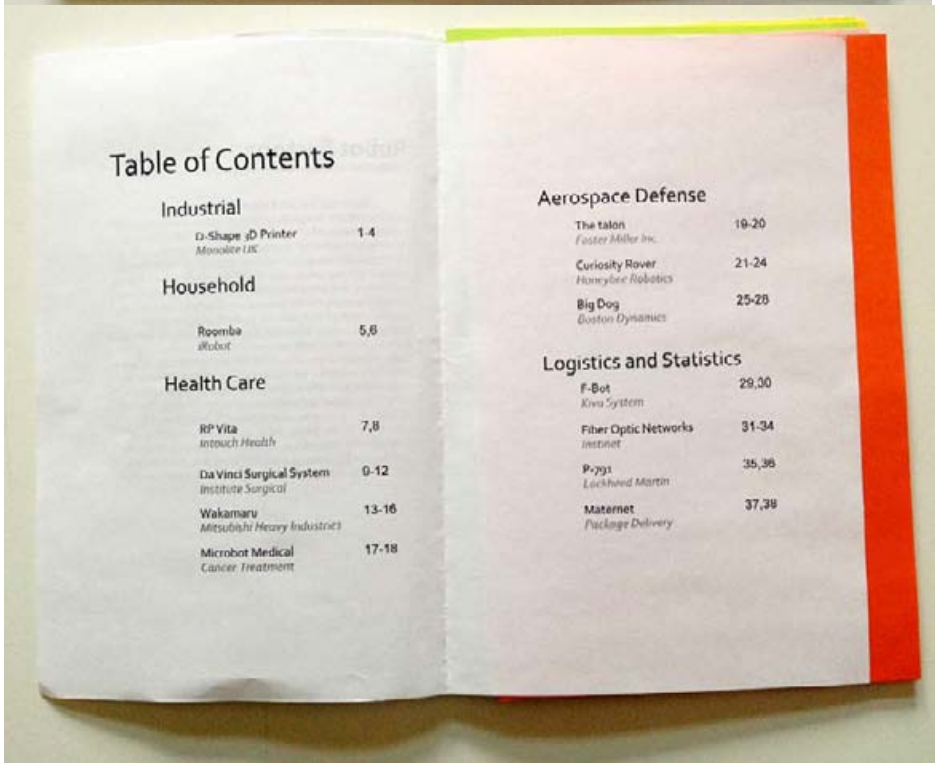
Study the company that produces your robot(s). How are they organized? What is their history? What markets do they serve? How do they make money? How do they produce their robots now? What relationships do they have with other companies and with finance?

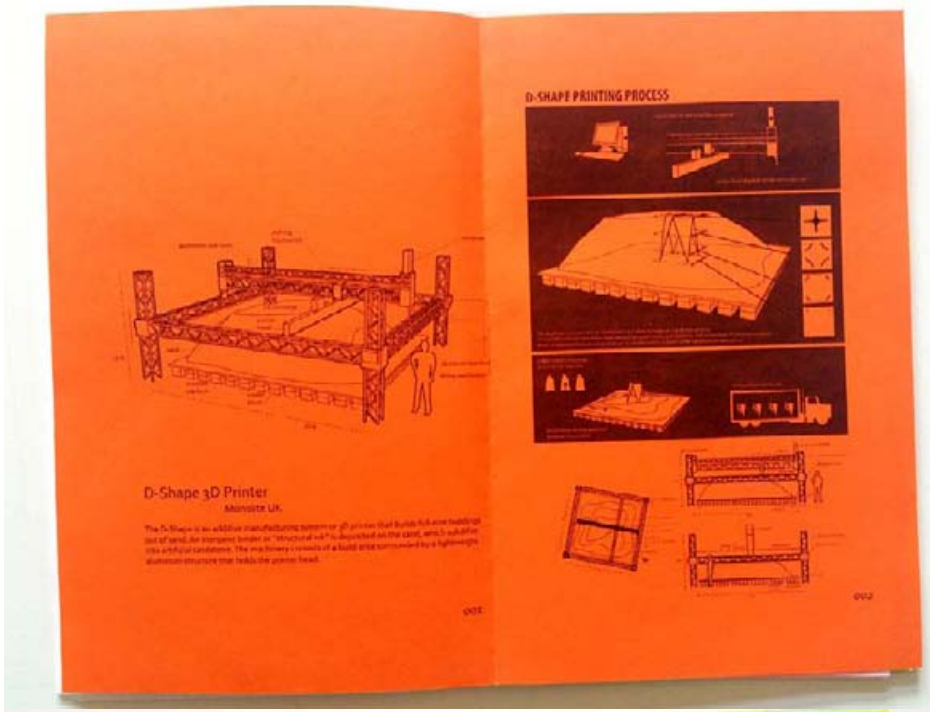
Draw four abstract diagrams. Two will be about the robot with one showing how the robot works and accomplishes its assigned tasks and the other showing how the robot interacts and works together with other robots, human actors, and machines to form a functional/production unit (a factory assembly line, an infantry battalion, a distribution center, a family, etc.). The others will, first, show how the company is organized (who owns it, how it is structured and financed, what its different parts and divisions are and how they work together to produce the robots you are considering) and the show how the company is related to other companies, resources and markets and how money and materials flow through this system as production takes place.

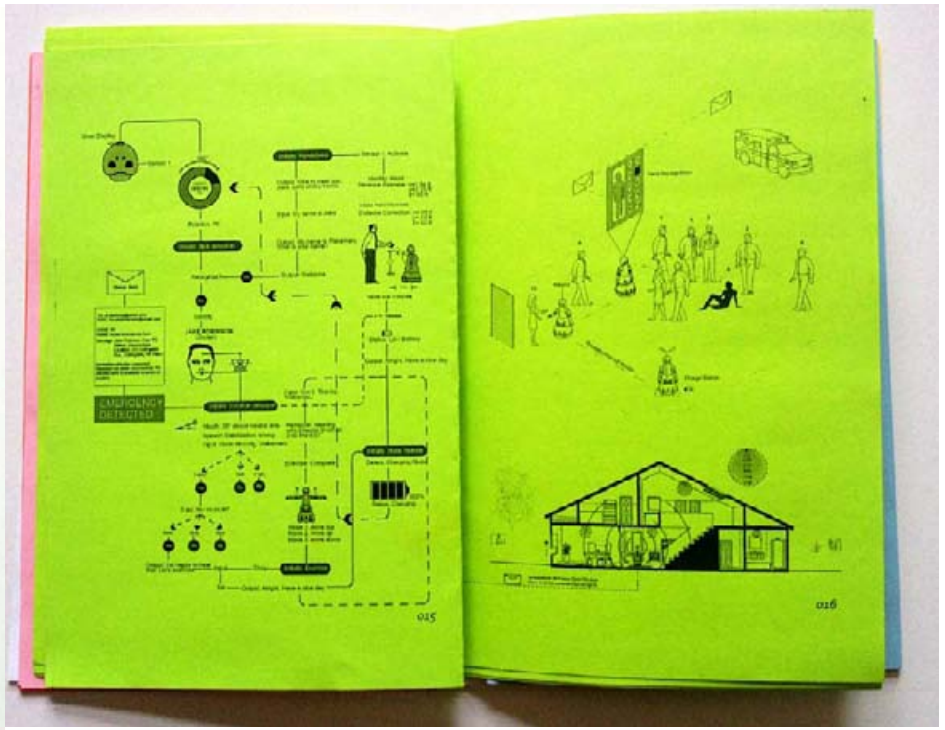
Some of the companies and parts of companies considered will be well established and highly structured. Others will be new start-ups, failed or dormant projects, not-yet-formed projections or impossibly crazy schemes. Collect what information you can and creatively fill in the gaps you find.

Diagrams should each fit on either an 11”x17” or 8.5”x11” sheet of paper and can either be completely abstract graphics or axonometric with pictorial icons.






D-SHAPE PRINTING PROCESS
D-Shape 3D Printer
Monolite UK.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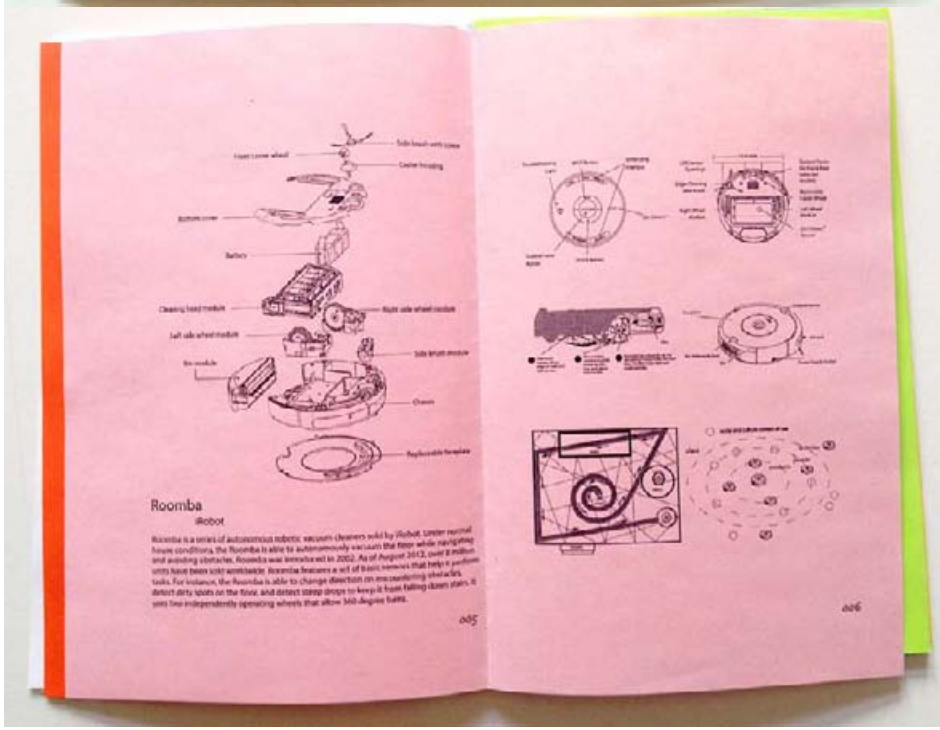
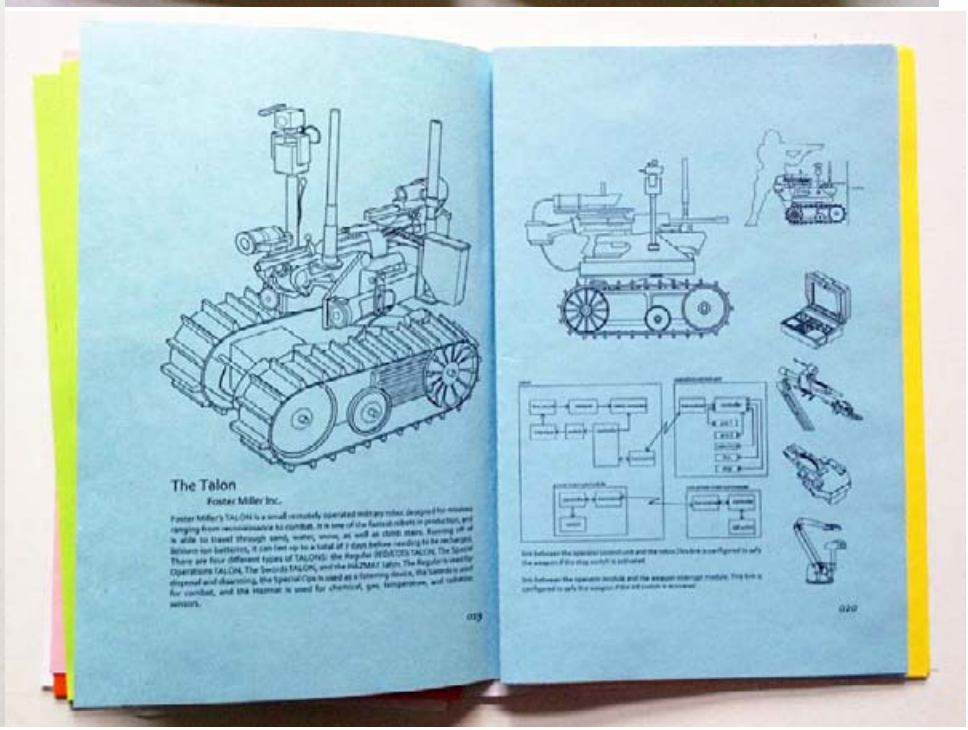
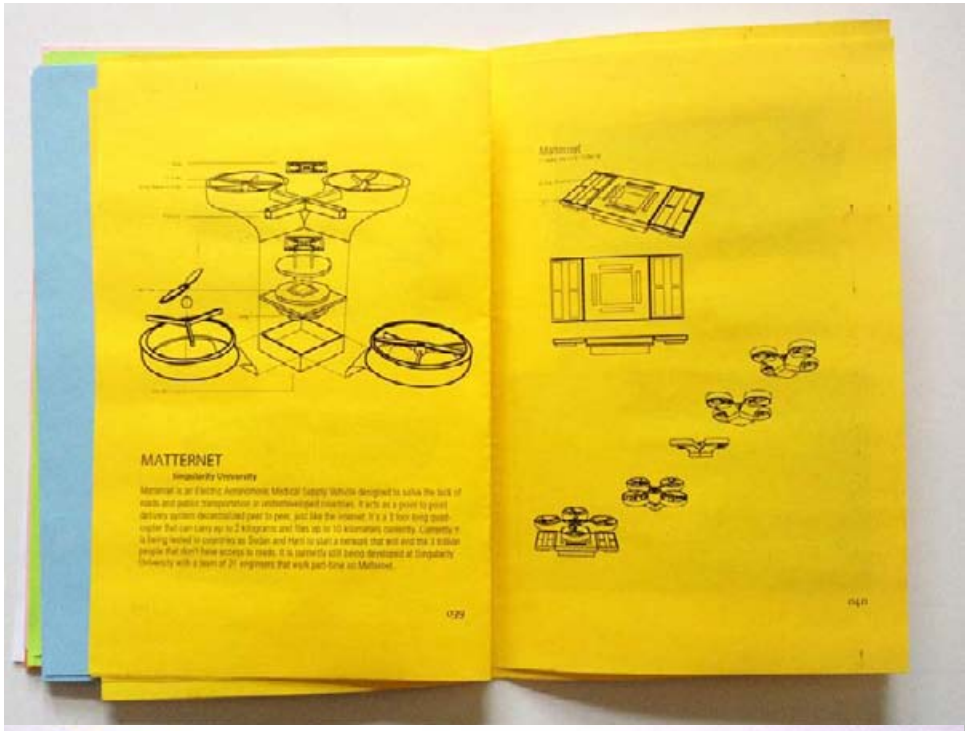

Roomba
iRobot


The Talon
Foster Miller Inc.



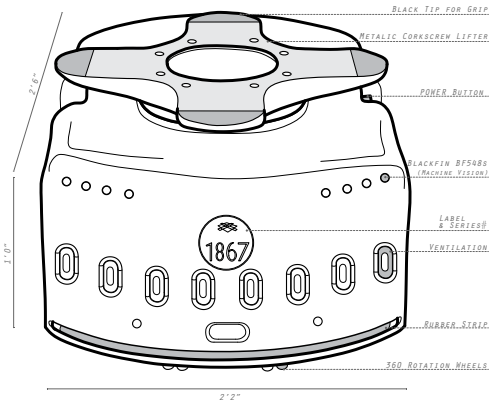
01.03 “The Pitch” — A Project Projected

Based on the understanding you have gained of your company and the technology they produce imagine how your company would come to Syracuse and build a production facility. What part(s) of the company would be based here? What would be done in this facility, what manufacturing processes would take place and what architecture and infrastructure would be needed to support then? Who would work there and where would they come from? What presence would the company and their products have in the city and how would they interact with the larger community? How would your project appear visually in the urban environment and what would its graphic/visual “identity” be?

To represent your projected project, produce another set of the diagrams you have done showing the new organization you are proposing and add additional diagrams of how your facility will function as a discreet entity and how it will be integrated into the various systems of Syracuse. Then produce a series of collaged perspectival images that convey the affective and semiotic qualities you hope to achieve.

01.04 (Collective Project): A Robot Bestiary

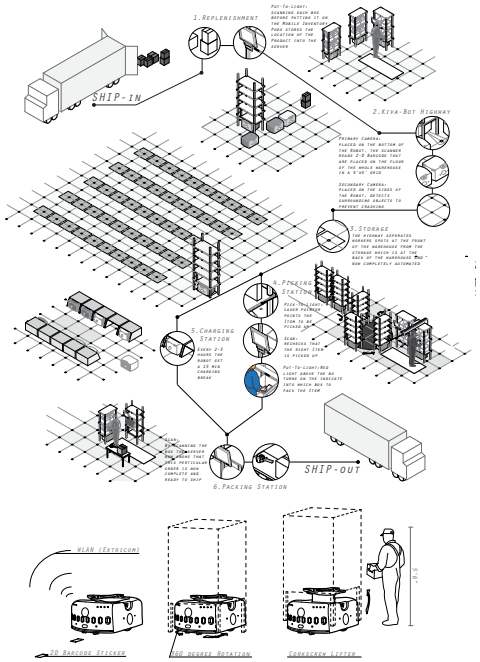
An editorial team will be selected from the section who will be responsible for developing a set of graphic standards for your drawings, diagrams and information graphics and collecting the research information into a publication cataloging the range of robot technology we will consider in our studio. The publication will have a standard entry for each company or robot project that will include our research drawings and diagrams as well as an explanation of the company and the technology they produce.

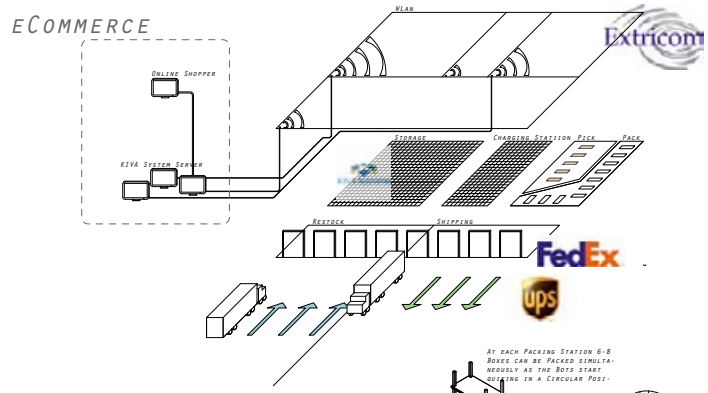


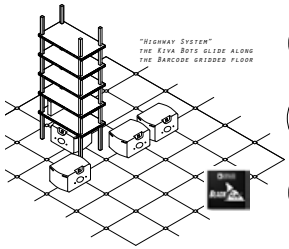
F - Bot

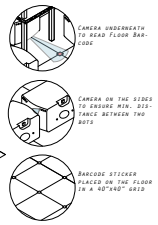
KIVA Systems

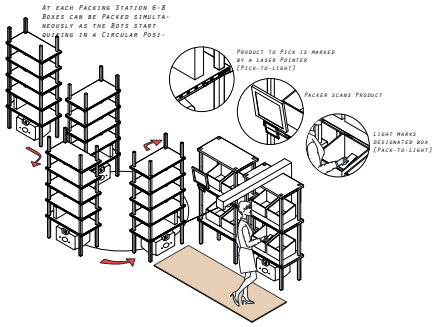
The Kiva System's Robotic Drive Unit first appeared on the market in 2009. Three years later, the Robot's patent was fully bought by Amazon.com for $775 million. The Robot works in warehouses and fullfillment centers. The key success of this robot lies in its simplicity. Bringing the Mobile Inventory Shelves (Pods) to the Packers in the Warehouse, the robot takes over the role of the Picker who before had to speed-walk upto 15 miles a day. Eliminating the factor of fatigue, this robot brings in efficieny, accuracy and a higher degree of order into the warehouse along with a huge costcuts in supply. One of it's economic advantages can be experienced by the Amazon Prime users who not only get upto 15% discount on many of their products, but also get 2-Day Free-Shipping.

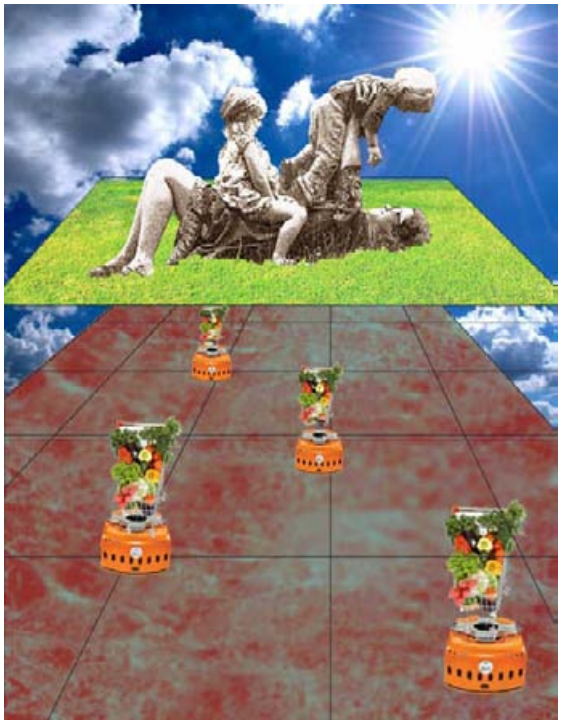












Phase 02: From System to Object

02.01.01 Collective Site Study

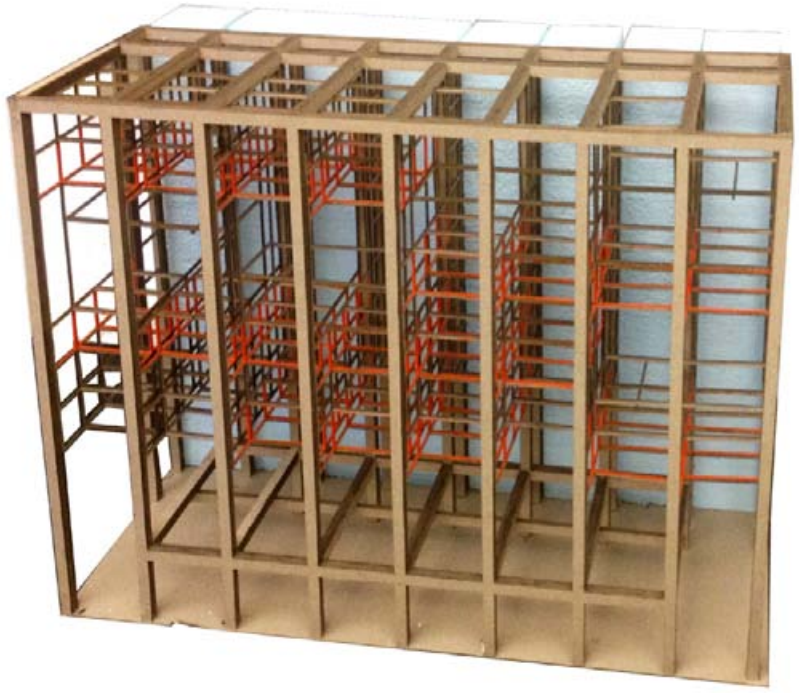
Acquire or create a map of the site that extends at least as far as the buildings fronting the east side of North Salina Street to the north-east, Laurel Street to the south-east, Clinton St. to the south-west and past the Spencer Street over pass to the North West. Determine heights of buildings and draw sections through the site to determine topography and the levels of the streets, the highway an the surrounding buildings. Photograph the elevations of the buildings facing and adjacent to the site. Also, photograph the site from viewpoints approaching from both the north and the south on North State Street, from East Division Street, From across I-81 and from a car passing the site on I-81 in both directions. Place this information in a shared folder on the studio drive so that all studio members have access to it.

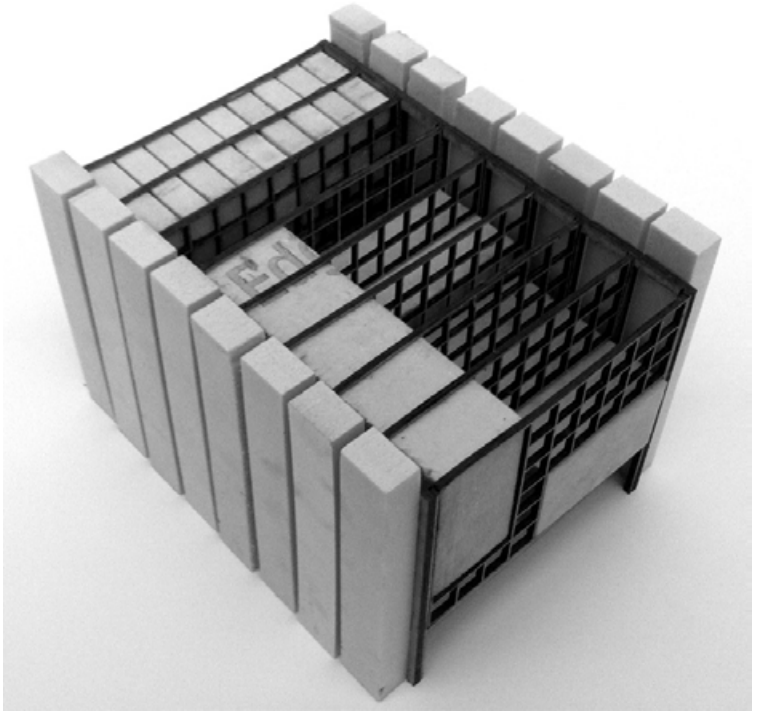
02.01.02 Individual Site Study

Map the uses of buildings surrounding the site and map the site in relation to the uses pertaining to your project at the relevant scales (neighborhood, Syracuse metropolitan, regional?, global?). Map the circulation patterns of various sorts of traffic (foot traffic, cars, cargo trucks ect.) round and through the site and study the ways that these will be extended and diverted through your project. Diagram the site, and the city as a system and determine how the systems you have already diagramed will transform and integrate into these existing systems.

02.01.03 Collective Site Model

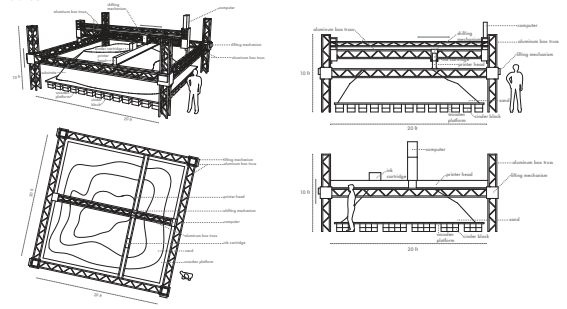
A large site model into which smaller massing models of each project can be inserted will be constructed at a scale to be determined from the site map. The site model will have it's own integrated base and will include enough context to show how projects relate to the surrounding urban fabric and infrastructure. The design of the site model will be developed by the 3D group and construction will be undertaken collectively by the studio as a whole under their direction.



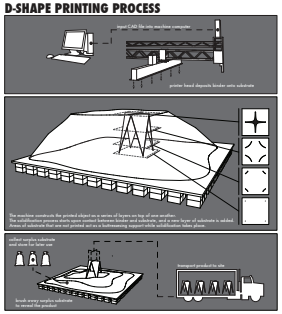


D-SHAPE 3D PRINTER

Monolite UK

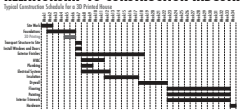


D-SHAPE PRINTING PROCESS



RELATIONSHIP TO CONSTRUCTION INDUSTRY

Typical Construction Schedule For a 3D Printed House



FITTING INTO THE NETWORK

Syracuse Construction Industry

SAND SUPPLIER

CLIENTS

general contractors

architecture firms

RELATED CONSTRUCTION

concrete manufacturing plants

steel fabrication

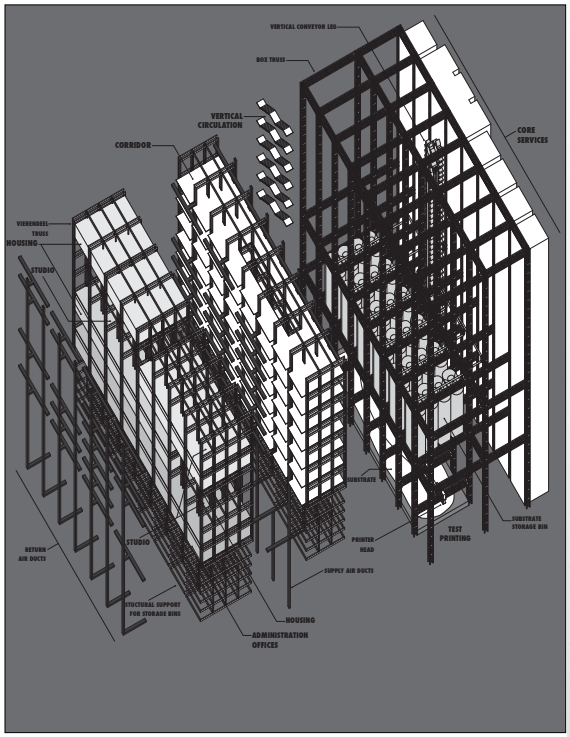
leader mills

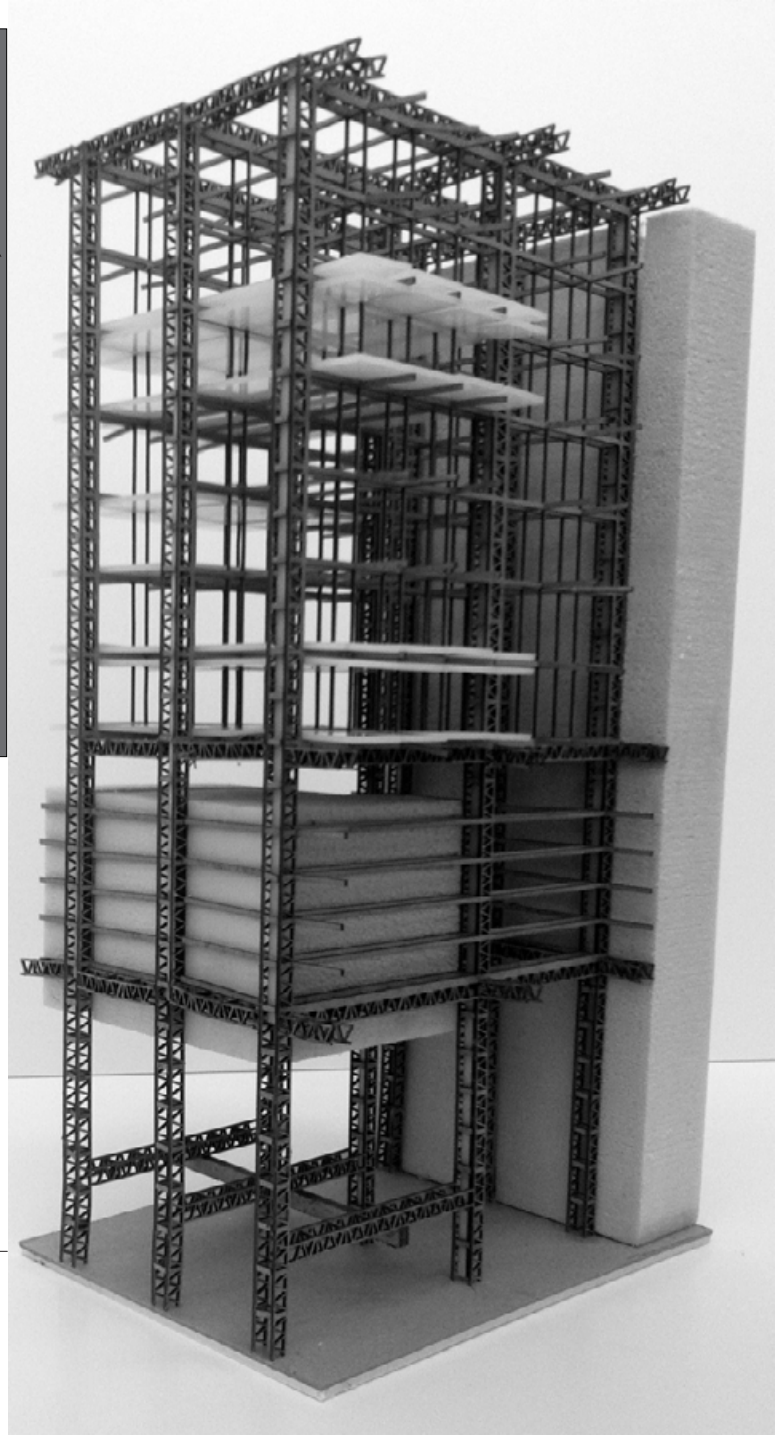
building suppliers

rigging companies

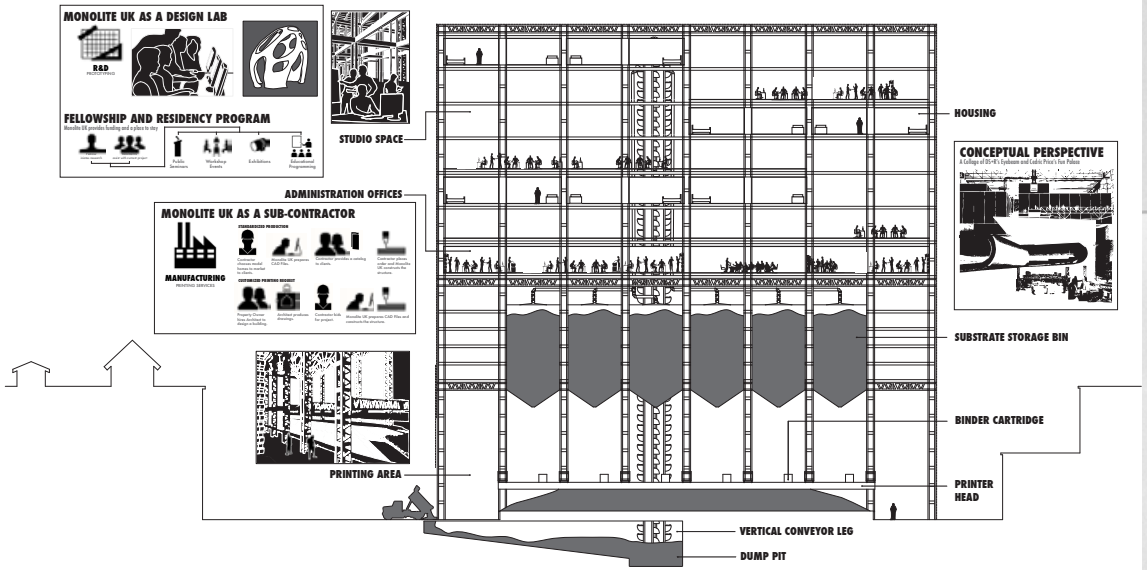
MANUFACTURING INFRASTRUCTURE

A LITTLE ROBOT WHO BECAME A FACTORY





MONOLITE UK DESIGN LAB AND TEST PRINTING FACILITY IN SYRACUSE, NY



Phase 03: Resolution

03.01.00 Collective Site/Systems Study

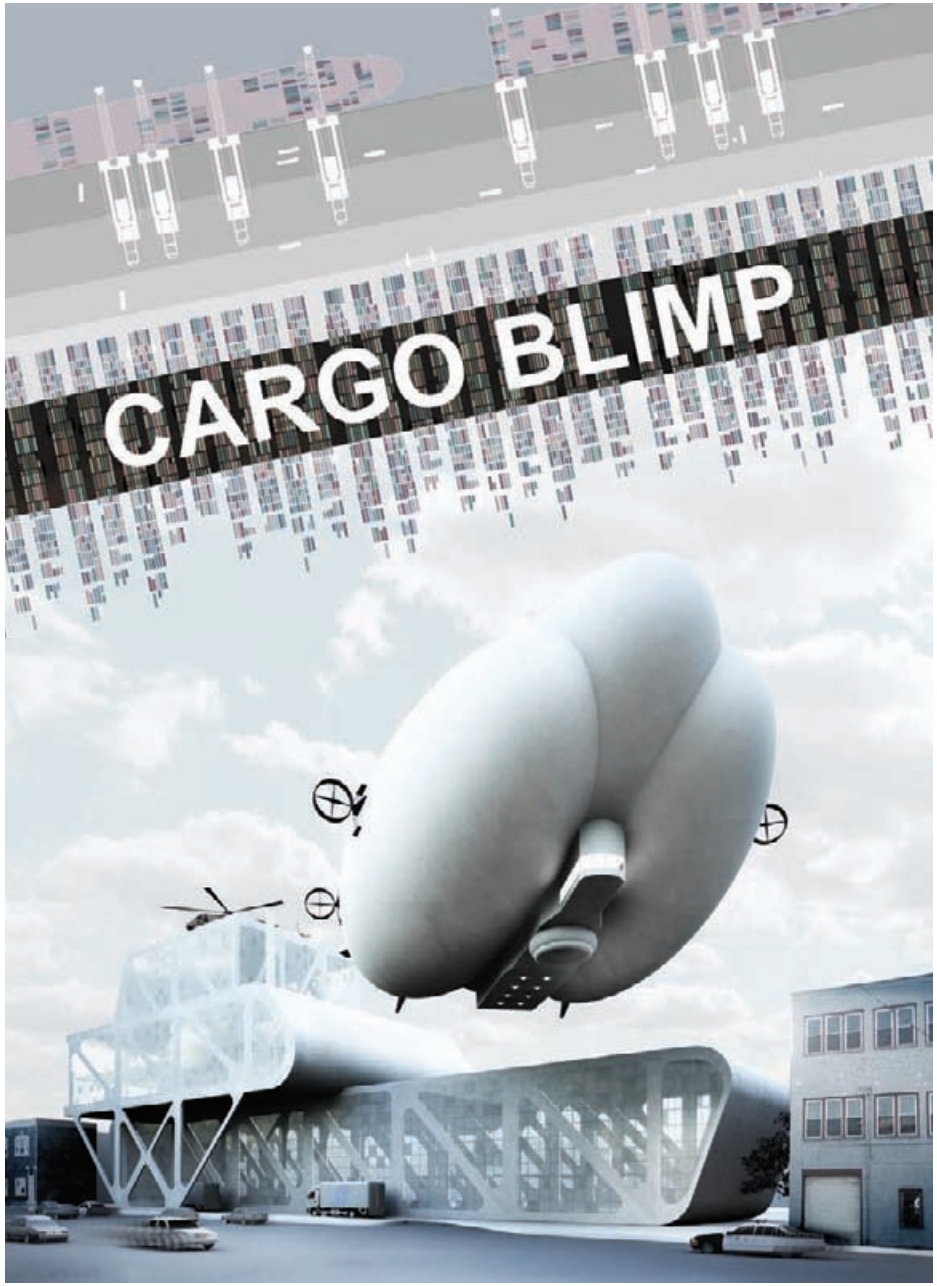
Finish construction of the site model. Produce maps, diagrams and photos boards explaining the site conditions to the final review jury. Plan the completion of the robot guide book.

03.01.01 Resolve Design

Take notes of the advice/critique received in the mid review. Apply these as you find them valuable in developing your project to completion. Draw plans of all significant levels of your project and also construct at lease one longitudinal section and two transverse sections showing street profiles and context. Draw elevations of both the State street and I-81 sides of your project. Be sure that three program elements — factory, housing, and public program — are developed in sufficient detail to clearly show your design intent and the position your project takes on the relations of production, reproduction and urban space.

03.02.01 Systems Development

Select at least two systems that are important to your project and develop them in detail. These can be “hard” material systems — structure, enclosure/ envelope, circulation, HVAC, the industrial processes of your factory (though this should already be well developed and documented and must be in all projects by the final) — or “soft” systems having to do with organization and communication such as graphic identity, the social system established by your project, communication and data systems, ect. It might be advantageous to select one of each type. Decide on a representation method that will be most effective in developing and communicating a detailed understanding of each system and that will supplement your representations of your project as a whole. Possible options include: large scale sectional models, full scale detail models, functional mock ups that model the working of the system, annotated/illustrated time lines, video animations, ect. A clear plan for these systems developments must be presented and approved by 12/11.



Cargo Blimps are remotely controlled by a fleet of **operators** which work around the clock. The problems associated with **rogue blimps**, **hackers** and **freight pirates** are managed by a special team of engineers and pilots. The **Cargo Blimp Transportation Network** manifests itself, physically at airports and cargo ports.

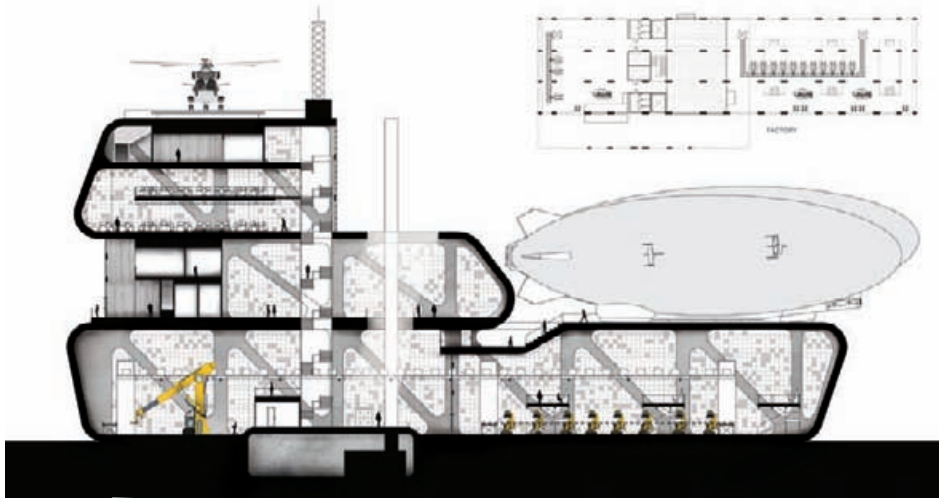
Common: A **skeleton crew of engineers** and designers manage the robots which produce the computers which automate Cargo Blimps. This crew resides in the general quarters adjacent to the common space and the **cantina**.

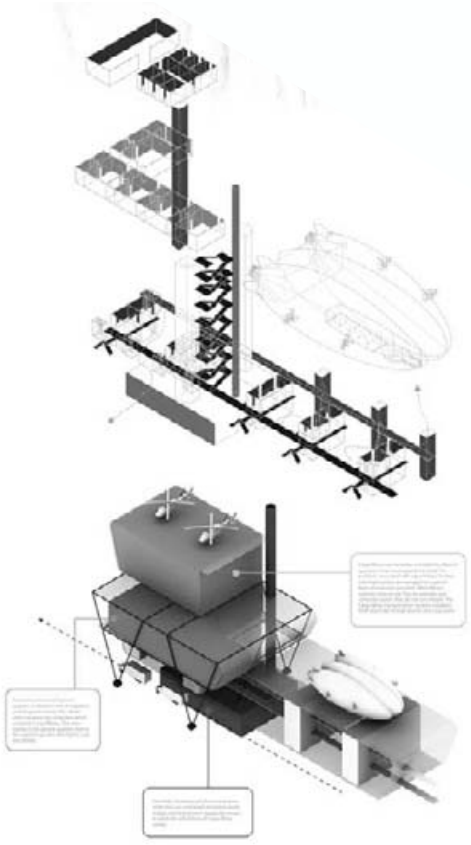
The **globalization** of the shipping trade has caused a demand for ports with **new organizational strategies**. In order to maintain competitive advantage, **port operators** must reduce operational costs through the use of integrated global chains, economies of scale and state of the art terminal and equipment management.

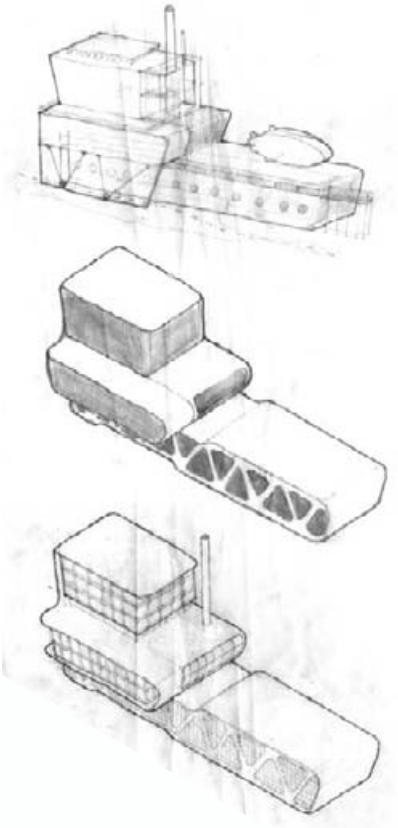
Supply chain advancements are happening in the major port cities (Rotterdam, Singapore). After **shipping containers** reach the port, they are distributed to various markets. The last leg of the supply chain is handled by truckes and trains; the last archaic forms of unautomated transportation. Handling freight by trucking and train both have various disadvantages. Introducing derigables into the equation provides a solution to many of these problems. Cargo blimps are more cost effective to operate and they can become **automated**.

"Cargo blimp is a company which caters to an increasingly **diversified market** which demands more efficient transportation of goods and comodities. Our **automated transportation dirigibles** make up a dense network which is controlled remotely via satellite from our headquarters in Syracuse, NY. Air controllers and advanced **algorithms** make sure that your goods arrive at their destination. On time."

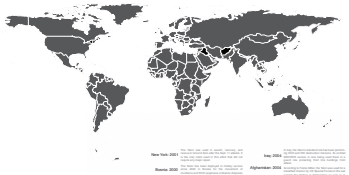
The HVAC, Plumbing and Electrical systems of the building are situated below grade. A mechanical room houses the **servers** in which the virtual brain of Cargo Blimp resides.

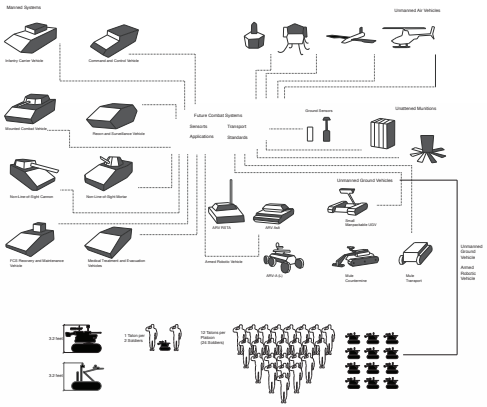


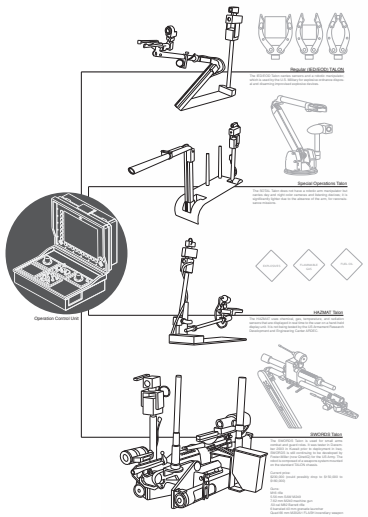


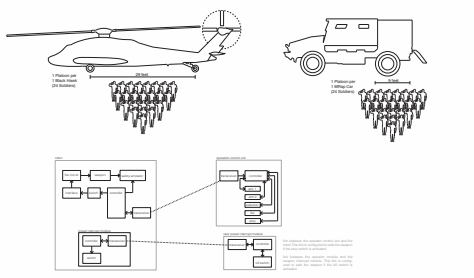


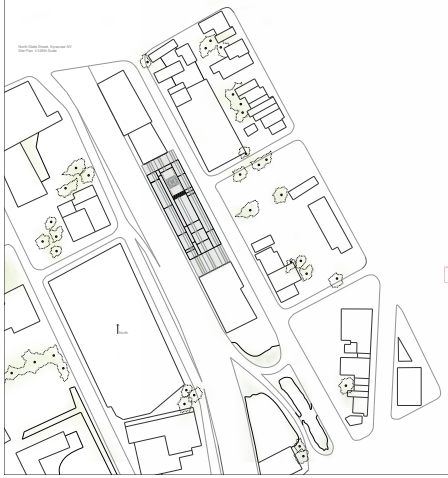
The Talon by Foster Miller Inc

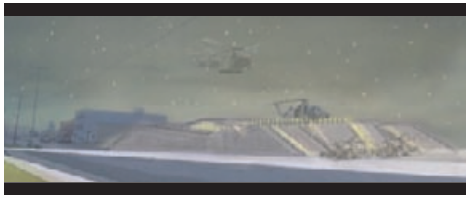


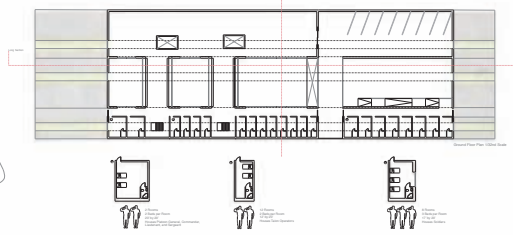


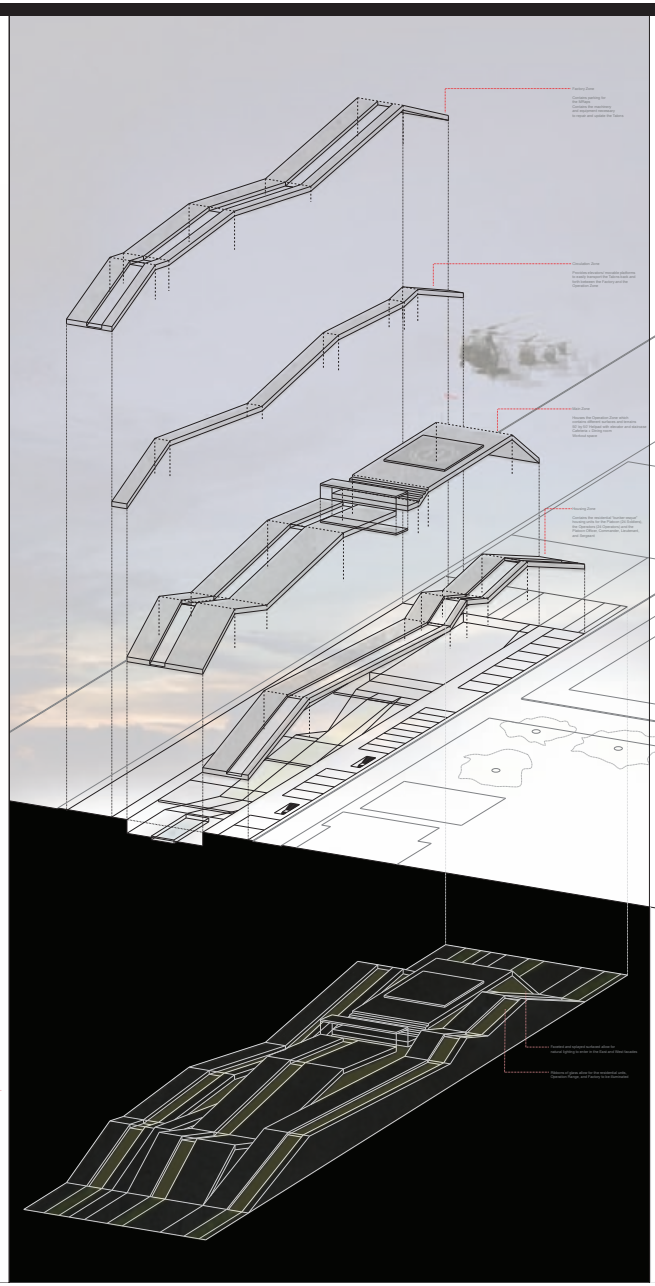


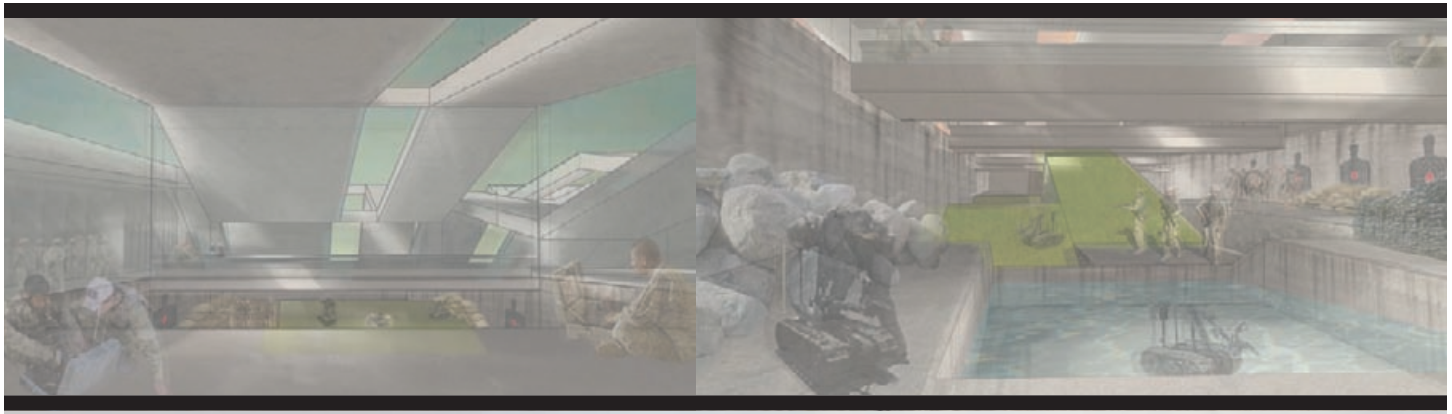


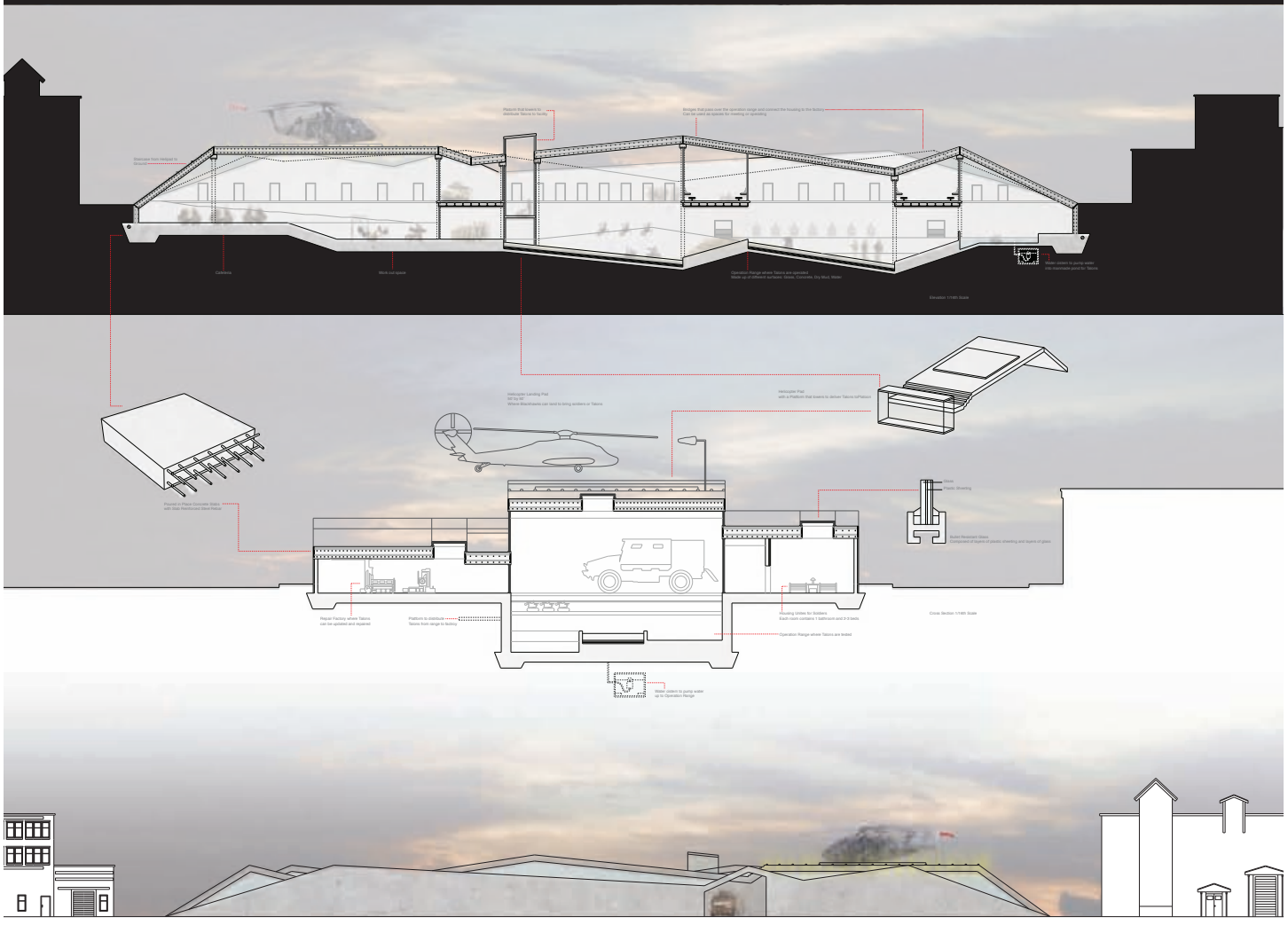


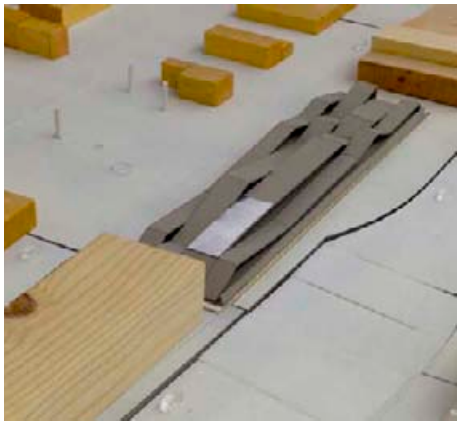






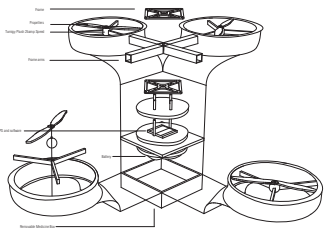


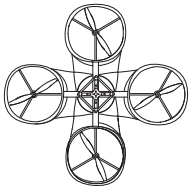

Platform that lowers to distribute Talons to facility
Bridges that pass over the operation range and connect the housing to the factory Can be used as spaces for meeting or spectating
Staircase from Helipad to Ground
Cafeteria
Work out space
Operation Range where Talons are operated Made up of different surfaces: Grass, Concrete, Dry Mud, Water
Water cistern to pump water into manmade pond for Talons
Elevation 1/16th Scale
Helicopter Landing Pad 60' by 60' Where Blackhawks can land to bring soldiers or Talons
Helicopter Pad with a Platform that lowers to deliver Talons toPlatform
Placed in Place Concrete Slabs with Steel Reinforced Steel Rebar
Glass
Steel, Shearing
Bullet Resistant Glass Composed of layers of plastic sheering and layers of glass
Repair Factory where Talons can be updated and repaired
Platform to distribute Talons from range to factory
Housing Unites for Soldiers Each room contains 1 bathroom and 2-3 beds
Operation Range where Talons are tested
Cross Section 1/16th Scale
Water cistern to pump water up to Operation Range



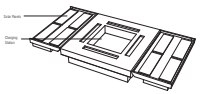
MATTERNET

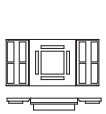
Matternet is an Electric Autonomous Medical Supply Vehicle designed to solve the lack of roads and public transportation in underdeveloped countries. It acts as a point to point delivery system decentalized peer to peer, just like the internet. It's a 3 foot long quadcopter that can carry up to 2 kilograms and flys up to 10 kilometers currently.
How could the Matternet pay for itself? Starting in Syracuse, NY, Matternet could replace and interact with other freight systems, as DHL.
The company itself is very utopian and is specifically seen as a family unitiy in a utopian world. Working for Matternet is like joining a community, a family.

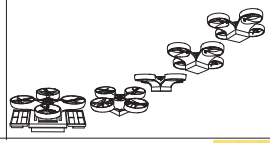


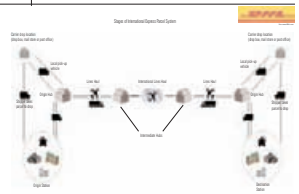


Matternet
Charging station for Matternet

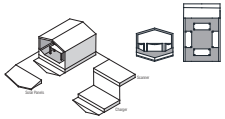




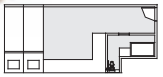


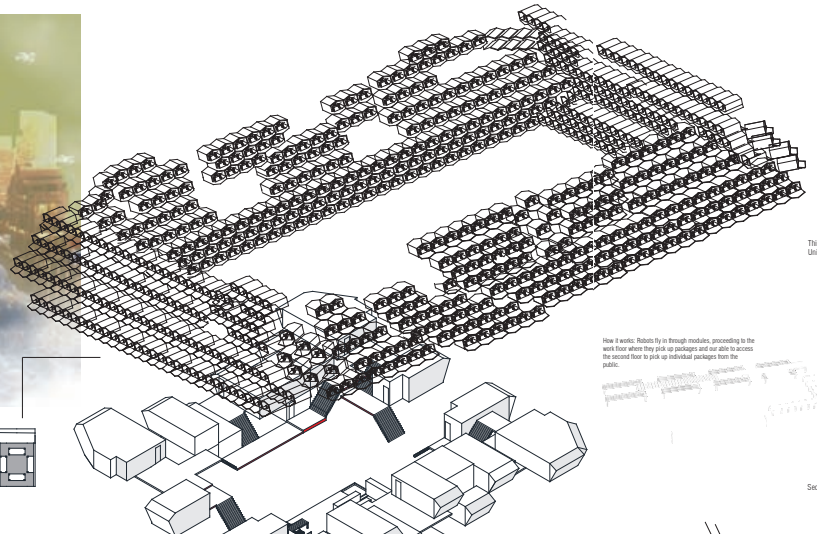


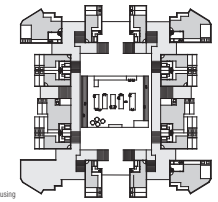
Modules for Drones



Modules for Workers

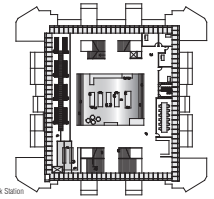




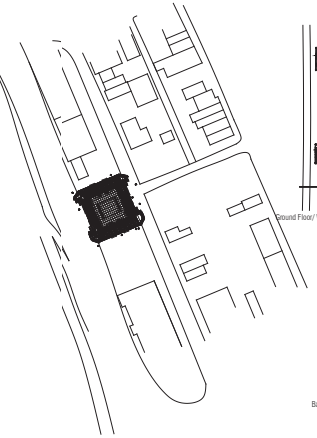


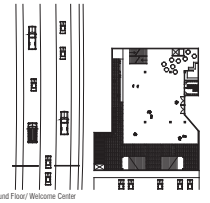
Third Floors : Housing Units

How it works: Robots fly in through modules, proceeding to the work floor where they pick up packages and our able to access the second floor to pick up individual packages from the public.

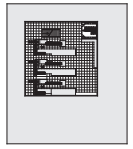


Second Floor/ Work Station



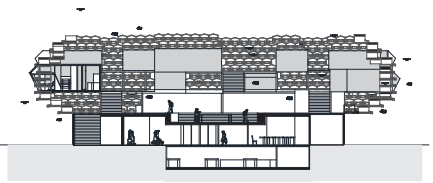


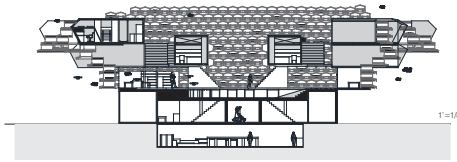
Ground Floor/ Welcome Center



Basement/Factory

1" =1/16"



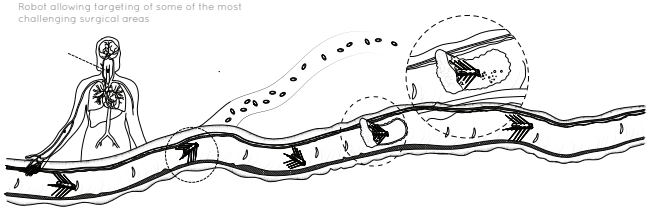


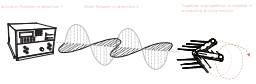
1" =1/8"

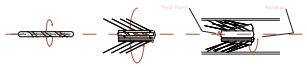
Microbot Medical

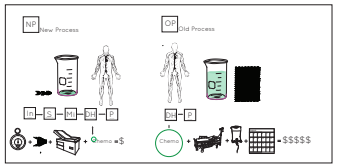
REVITALIZING A CITY THROUGH A NEW PROCESS

ViRob: An Autonomous Advancing Micro-Robot allowing targeting of some of the most challenging surgical areas









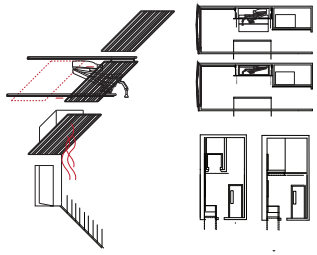
Active Streets

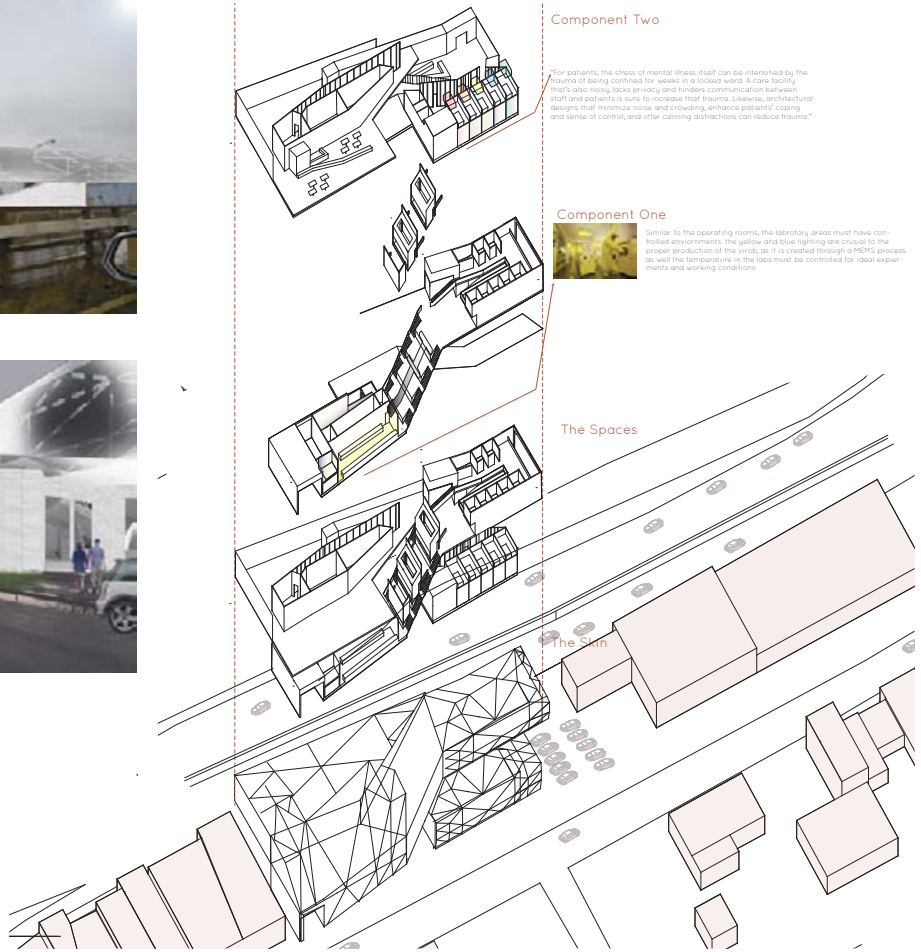
Medical Buildings

Area Typologies

The Skin and Operating Rooms

"For patients, the stress of mental illness itself can be intensified by the trauma of being confined for weeks in a locked ward. A care facility that's also noisy, lacks privacy and hinders communication between staff and patients is sure to increase that trauma. Likewise, architectural designs that minimize noise and crowding, enhance patients' coping and sense of control, and offer calming distractions can reduce trauma."





The Skin Structure

Controlling Light and Air through Apatures