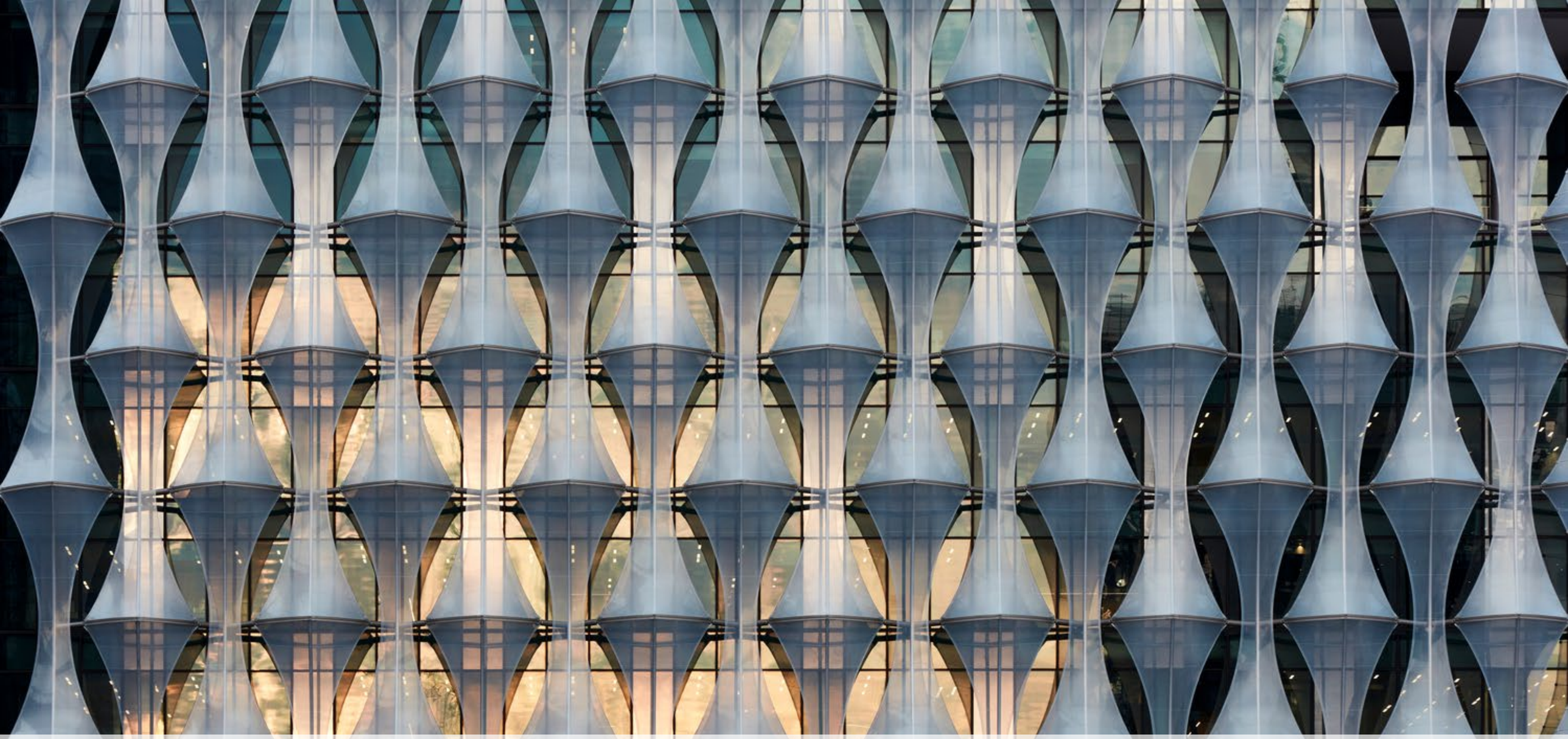

HOW DO WE SEE THE FUTURE (OF ARCHITECTURE)?

James Timberlake, FAIA, LEED Fellow

KieranTimberlake

2019 AIA Project Delivery Symposium

Overview:

The future is coming at us with increasing speed, driving more rapid changes and ever-greater complexity into our industry. In response, our profession has been fragmenting into increasingly narrow areas of specialty. An examination of project delivery must include a perspective from the highest levels to recognize the forces splintering project teams and provide awareness of the hidden gaps emerging between specialists. This presentation will return our attention toward unifying the team around the humanitarian themes of sustainability, diversity and community.

Learning Objectives:

1. Offer a framework, analysis and critical assessment of the challenges and opportunities inherent in the AEC systematic transformation.
2. Guide how evolving social expectations of building – like urbanism or sustainability – change the inherent expectations of design results and the architect's role.
3. Expand your knowledge and sharpen your foresight on where the future of project delivery is heading.
4. Enlighten how market demands press the AEC industry to leverage technology to improve and meet the challenges of twenty-first century construction and minimize implications on global climate change.
5. Provide direction for a new era in architectural creation that can be understood and managed by a profession that must become better equipped to direct Project Delivery and deliver the future.

March 12, 2019

Keynote 3:
3:30 - 4:00 PM

Q&A:
4:00 – 4:15 PM

Total: 45 minutes

Speaker:
James Timberlake, FAIA, LEED Fellow

Title: How do we see the future (of Architecture)?

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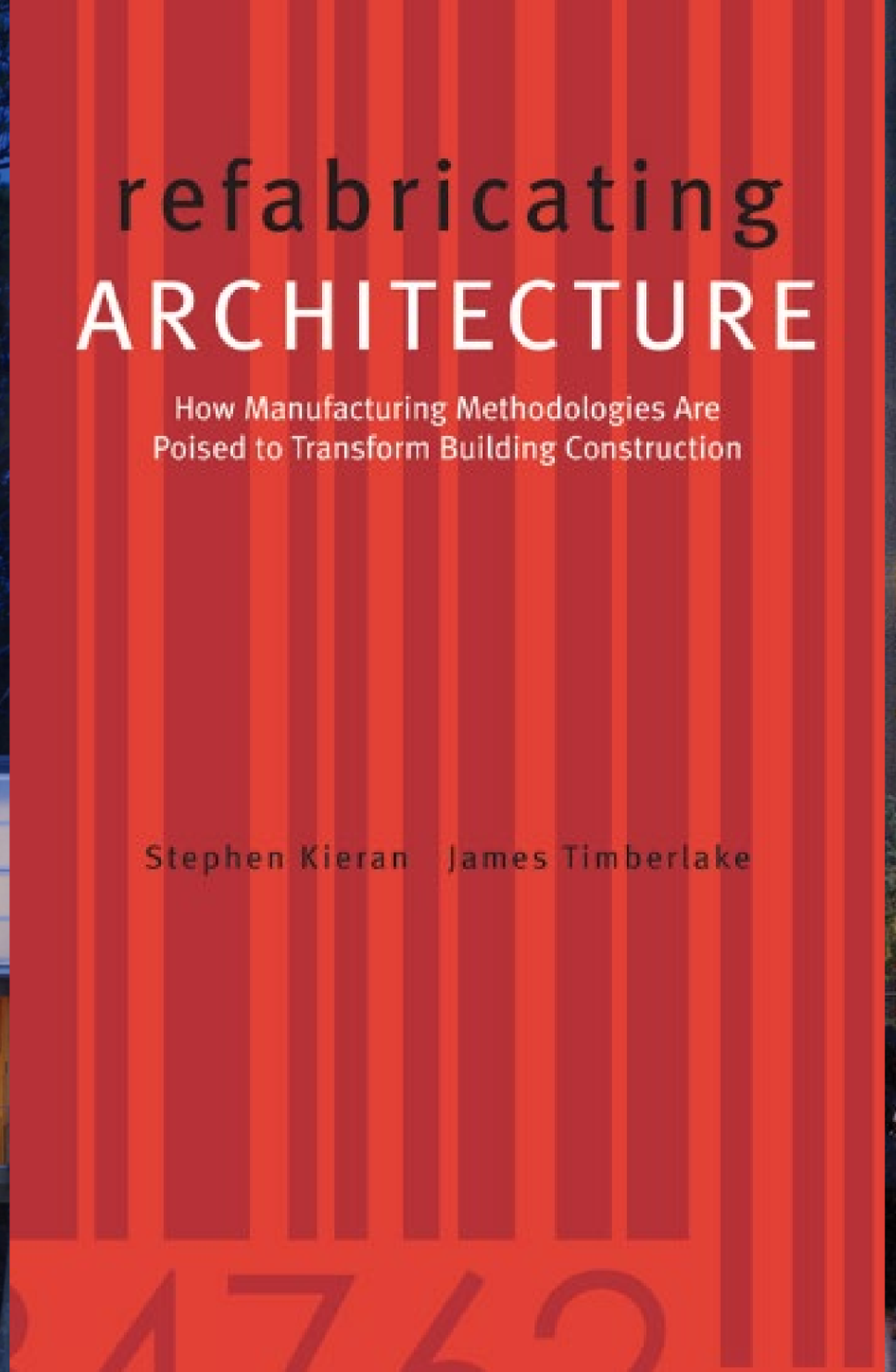
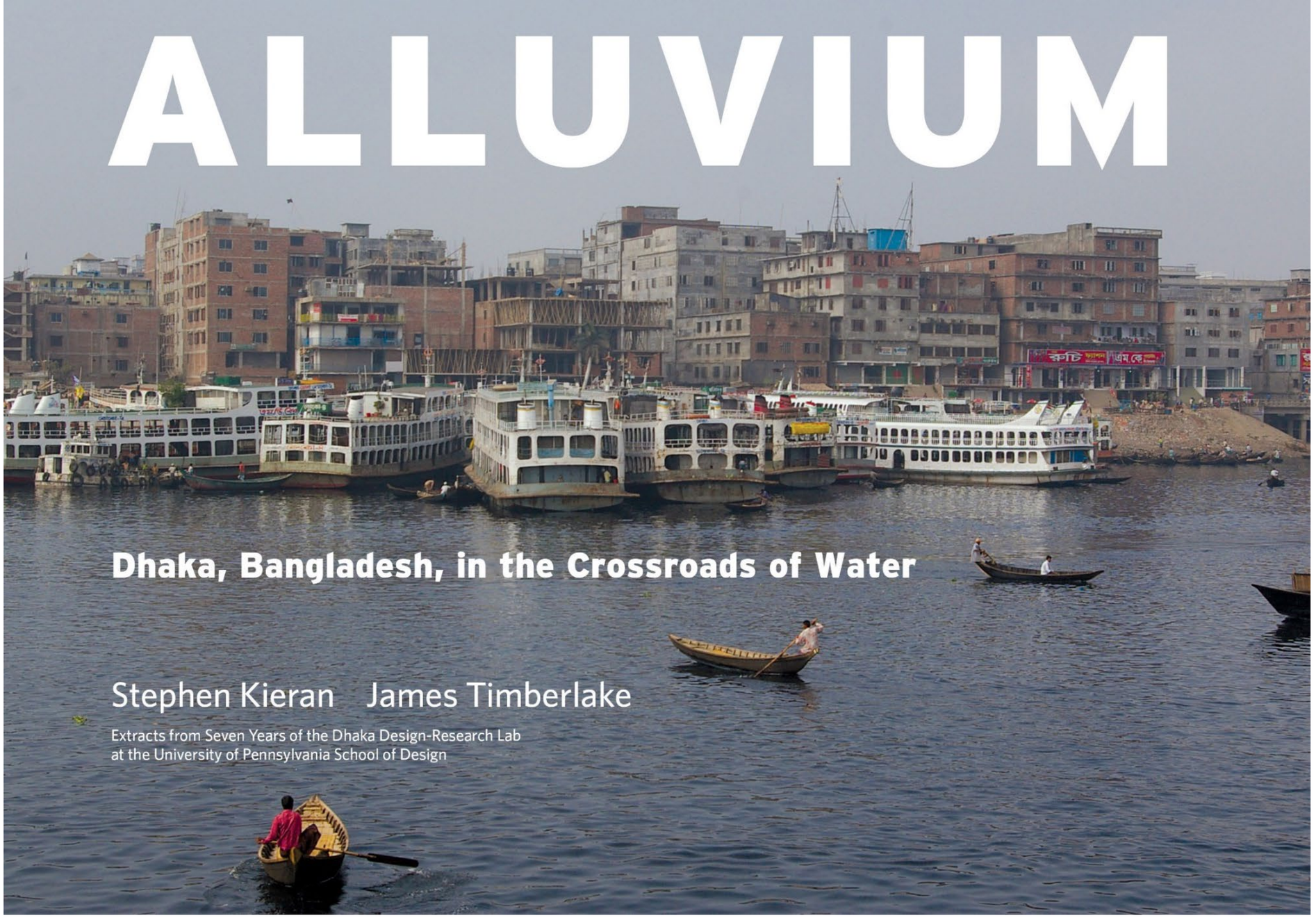
Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.


Loblolly House
Elements of a
New Architecture
Stephen Kieran
James Timberlake
Preface by Barry Bergdoll
Introduction by Michael Stacey


refabricating
ARCHITECTURE
How Manufacturing Methodologies Are
Poised to Transform Building Construction
Stephen Kieran James Timberlake


CELLOPHANE HOU


ALLUVIUM
Dhaka, Bangladesh, in the Crossroads of Water
Stephen Kieran James Timberlake
Extracts from Seven Years of the Dhaka Design-Research Lab
at the University of Pennsylvania School of Design

31%

Percentage decrease in the cumulative area of water bodies in Dhaka between 1975 and 2003

32%

Percentage decrease in wetlands and low-lands in Dhaka between 1975 and 2003

39%

Percentage decrease in vegetation in Dhaka between 1975 and 2003

29%

Percentage decrease in cultivated land in Dhaka between 1975 and 2003

290%

Percentage increase in built-up land in Dhaka between 1975 and 2003

145%

Percentage increase in filled-in land in Dhaka between 1975 and 2003

868 m^2

Estimated area of lowland and wetland filled by one sand barge crew in one day

$60 / ft^2

Cost in US dollars per square foot of land in prime residential districts of Dhaka

$32.30 / ft^2

Cost in US dollars per square foot of land in New York City

1988; 1998; 2004

Years when Dhaka experienced severe, monsoon-induced flooding

627; 644; 410 km^2

Area of flood water per year during these years

10

Years required to build an embankment to protect Dhaka's western edge from flood

1988–1998

4.38 m

Height by which the water level is expected to increase in Dhaka due to sea level rise in the Bay of Bengal by 2050

9.4 m

Height of the embankment wall in meters

10.4 m

Height of the embankment wall needed to secure the city during a flood event after 2050

2001

Year that Dhaka passed the Urban Water Body Protection Law to preserve the natural drainage channels from infill

1.23% / year

Rate of wetland loss per year between 1988 and 1999

5.67% / year

Rate of wetland loss per year between 2000 and 2005

2002

Year that Bangladesh imposed a nation-wide ban on plastic shopping bags to reduce the clogging of the city's drainage infrastructure and embankment floodgates

57 %

Percentage increase in jute yield following the ban on plastic shopping bags

1,080,000 tons

Amount of jute produced in 2012

3,800,000,000

Number of sustainable shopping bags made from 1.08 million tons of jute

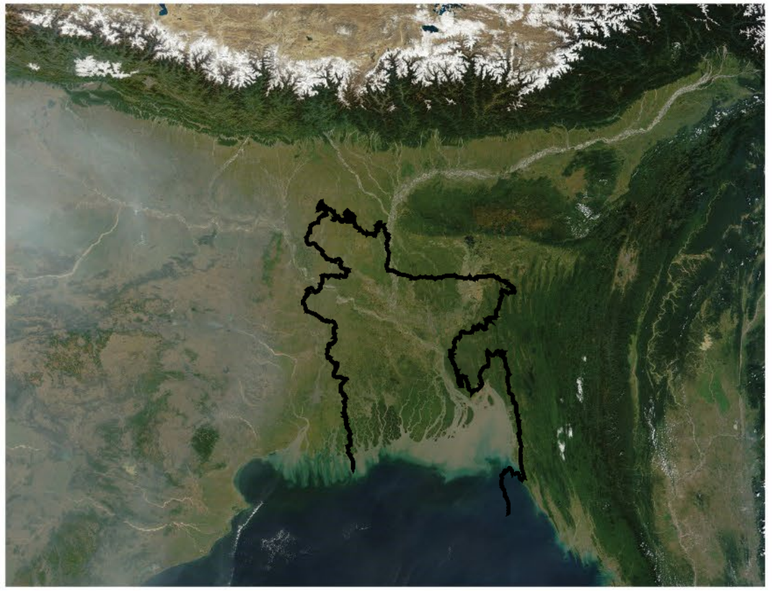
2

Bangladesh's current global position as an exporter and producer of jute

NUMBER ONE: INDIA

RIVERS AND SEDIMENT IN BANGLADESH

Bangladesh was formed at the mouth of this river system, where sediment was deposited to form an extremely low topography with vulnerable shifting land. The minimal change in elevation across the area of the deltaic basin creates floodplains for enormous amounts of seasonal rainfall.

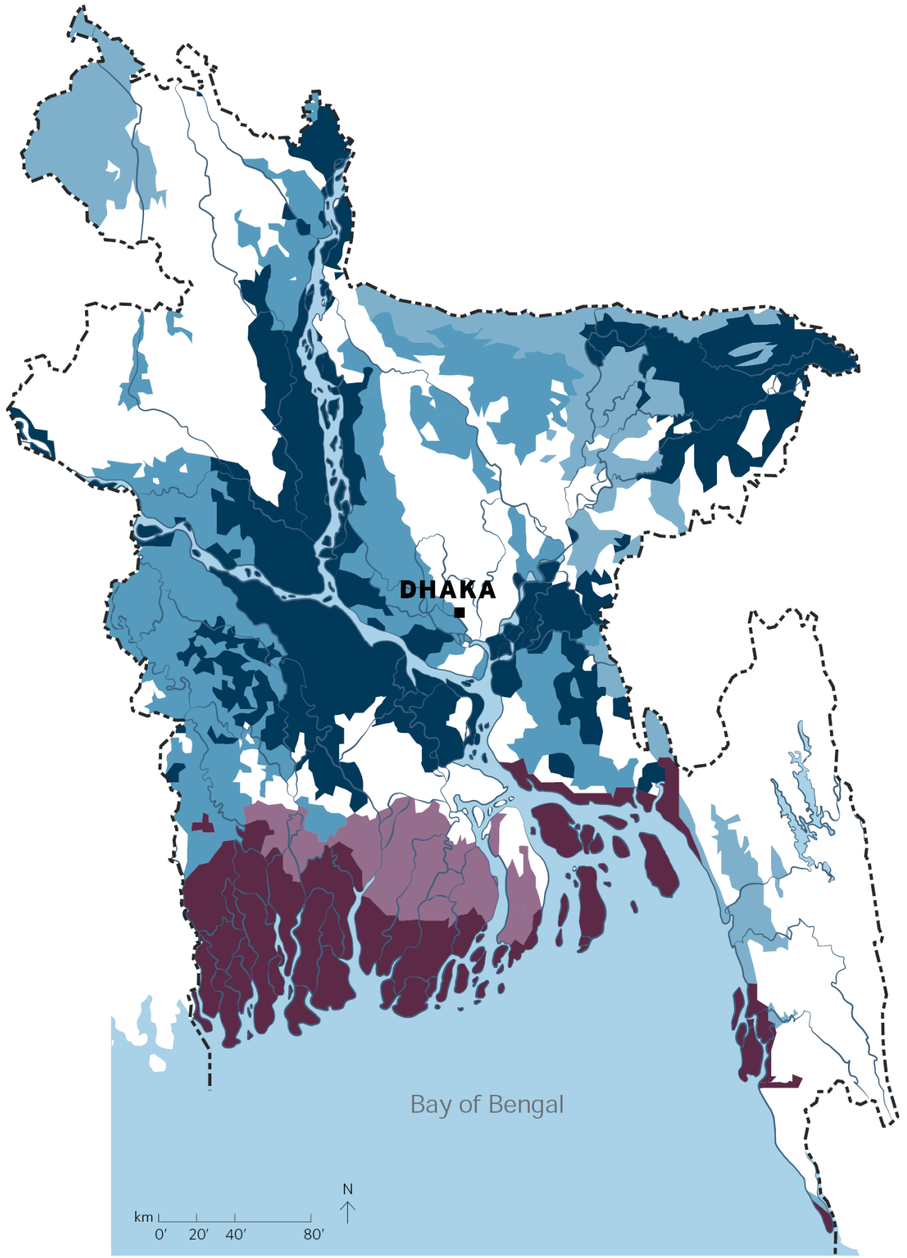


Sediment discharged at the mouth of the mega-delta

River density in Bangladesh

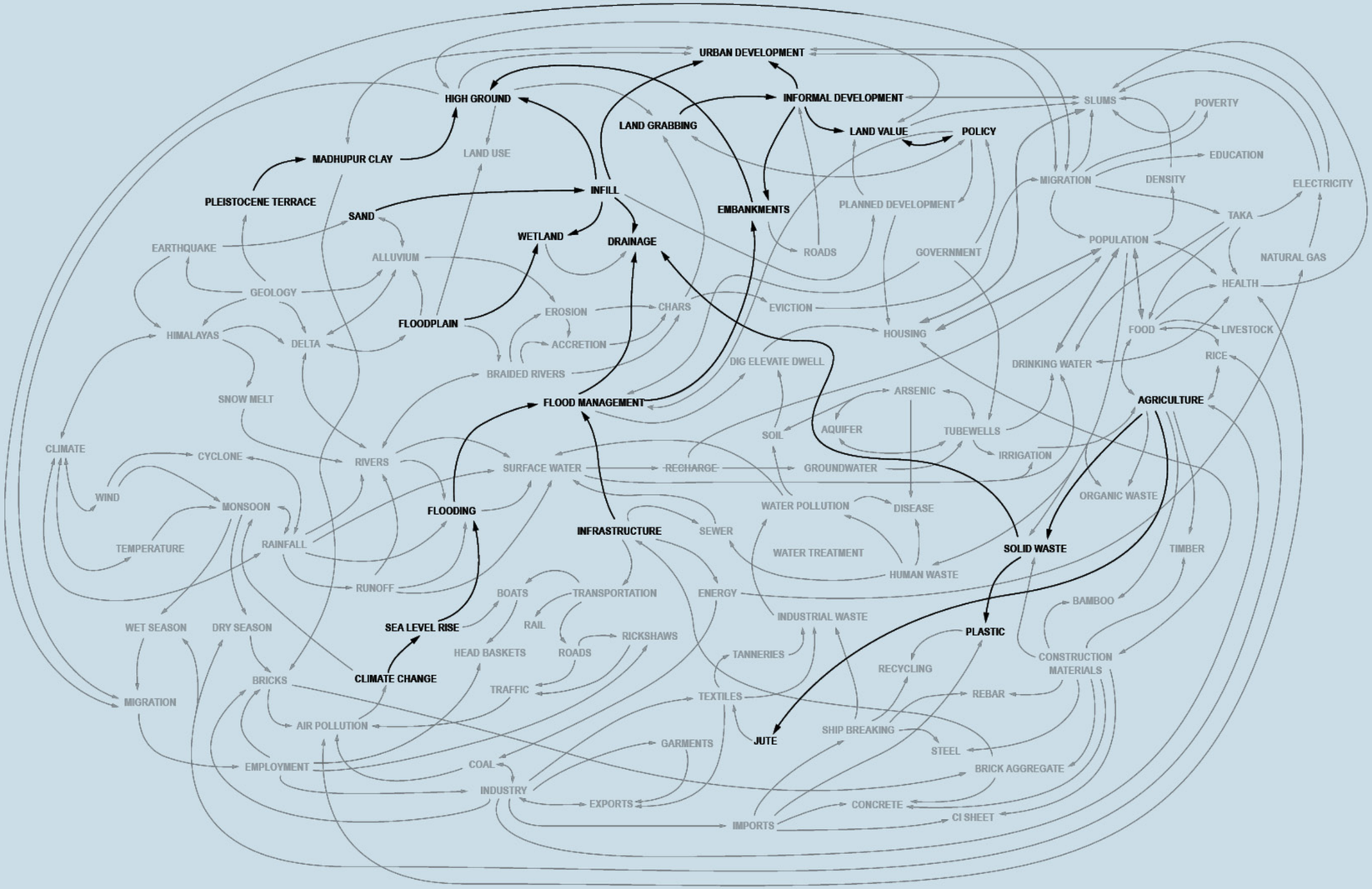
FLOODPLAINS IN BANGLADESH

Massive rainfall, runoff from the Himalayas and the entire Ganges-Brahmaputra river basin, and cyclone-driven tidal surges combine with the extremely low geographic elevation of the country to put eighty percent of the country at risk of being inundated at some point during the annual monsoon and cyclone seasons.



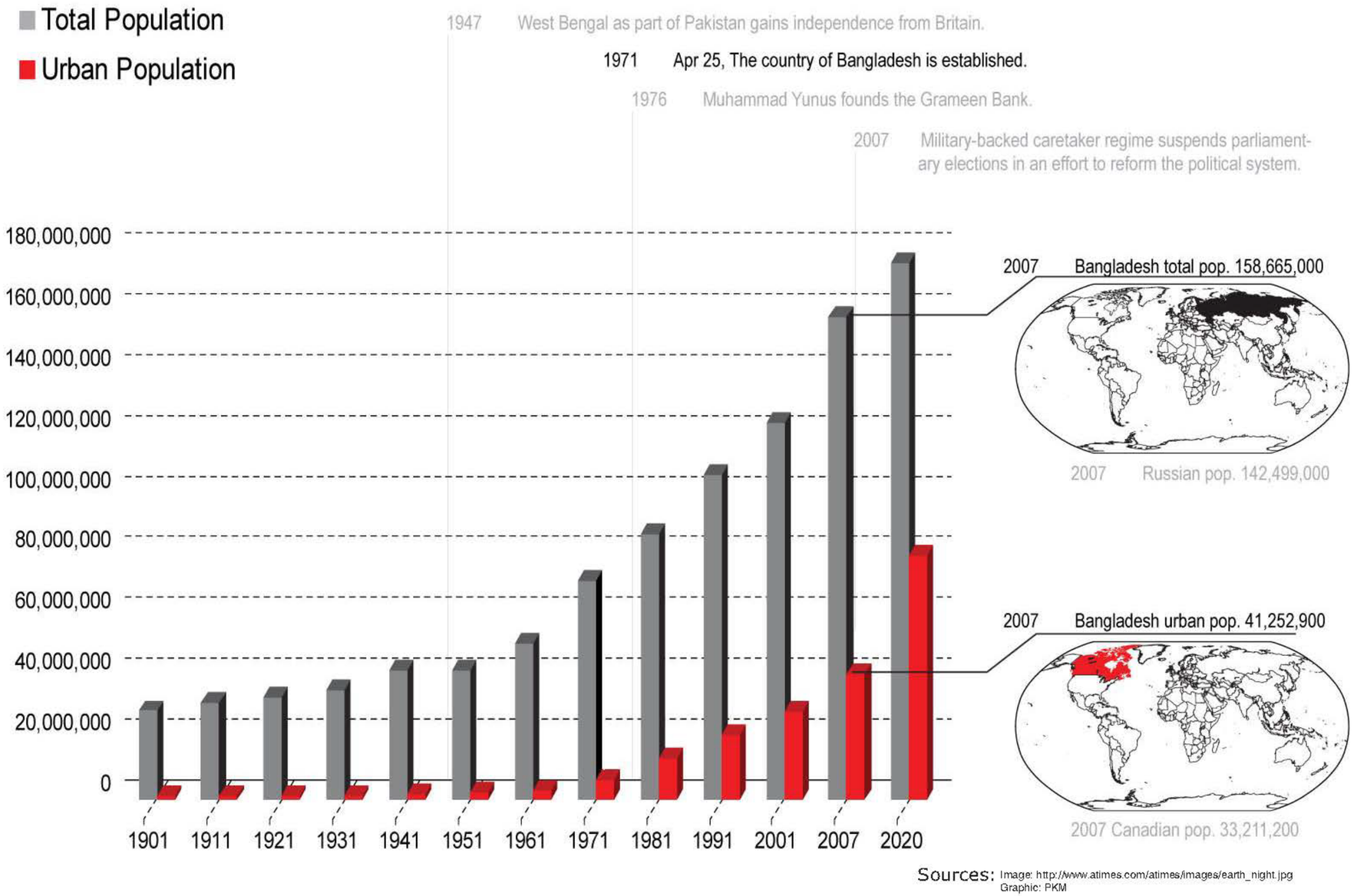
Areas affected by floods and tidal surge

- Severe-moderate river flood
- Low river flood
- Flash flood
- Moderate tidal surge
- Severe tidal surge


URBAN DEVELOPMENT
HIGH GROUND
INFORMAL DEVELOPMENT
SLUMS
POVERTY
LAND GRABBING
LAND VALUE
POLICY
EDUCATION
MADHUPUR CLAY
LAND USE
MIGRATION
DENSITY
ELECTRICITY
PLEISTOCENE TERRACE
INFILL
EMBANKMENTS
PLANNED DEVELOPMENT
TAKA
SAND
WETLAND
DRAINAGE
POPULATION
EARTHQUAKE
ALLUVIUM
ROADS
GOVERNMENT
NATURAL GAS
GEOLOGY
HEALTH
EROSION
CHARS
EVICTION
FLOODPLAIN
HIMALAYAS
DELTA
ACCRETION
HOUSING
FOOD
LIVESTOCK
BRAIDED RIVERS
DIG ELEVATE DWELL
DRINKING WATER
RICE
SNOW MELT
FLOOD MANAGEMENT
ARSENIC
AGRICULTURE
CLIMATE
SOIL
AQUIFER
TUBEWELLS
CYCLONE
RIVERS
SURFACE WATER
RECHARGE
GROUNDWATER
IRRIGATION
WIND
ORGANIC WASTE
MONSOON
FLOODING
WATER POLLUTION
DISEASE
INFRASTRUCTURE
SEWER
SOLID WASTE
TEMPERATURE
RAINFALL
WATER TREATMENT
TIMBER
HUMAN WASTE
RUNOFF
BOATS
TRANSPORTATION
ENERGY
BAMBOO
RAIL
INDUSTRIAL WASTE
WET SEASON
DRY SEASON
SEA LEVEL RISE
PLASTIC
RICKSHAWS
HEAD BASKETS
ROADS
TANNERIES
CONSTRUCTION MATERIALS
RECYCLING
BRICKS
CLIMATE CHANGE
TRAFFIC
REBAR
MIGRATION
TEXTILES
AIR POLLUTION
SHIP BREAKING
JUTE
GARMENTS
STEEL
EMPLOYMENT
COAL
BRICK AGGREGATE
INDUSTRY
EXPORTS
CONCRETE
IMPORTS
CI SHEET

Rural-Urban Migration

Urbanization in Bangladesh, 1901-2020



Sources: Image: http://www.atimes.com/atimes/images/earth_night.jpg
Graphic: PKM


M.T. PRINCE-2
M.T. PRINCE-1

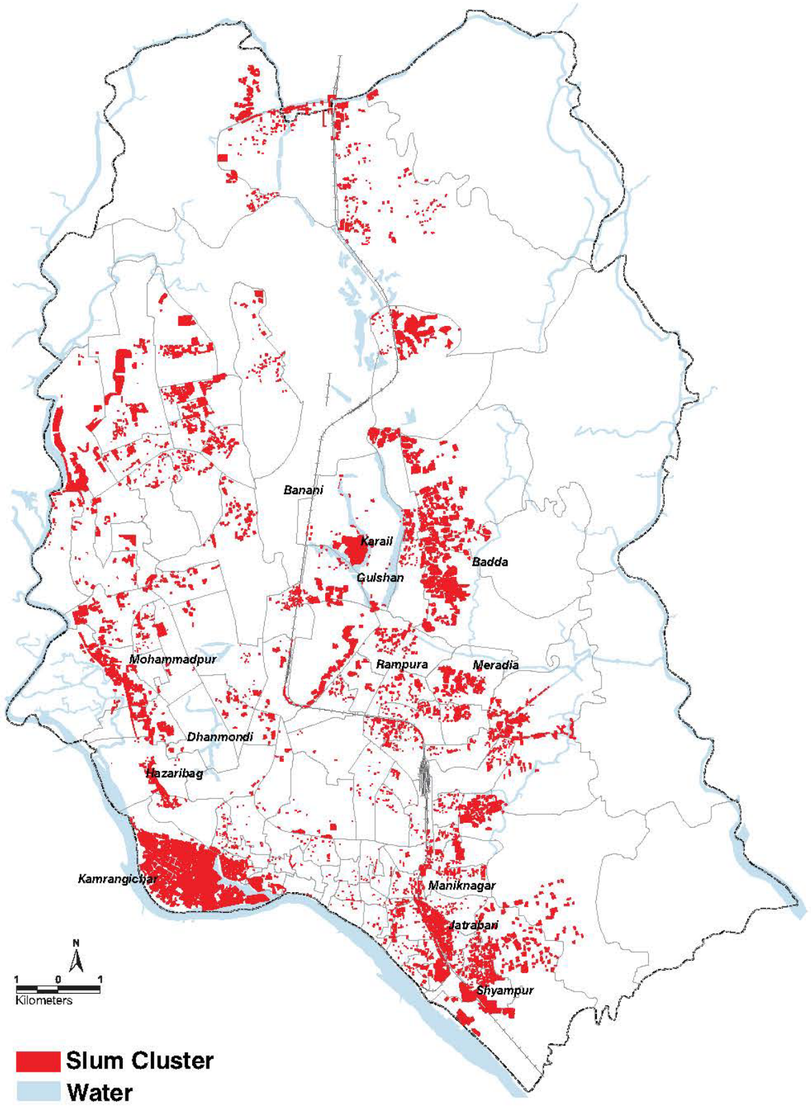

ALTECH
ALUMINIUM
Polar
ICE CREAM


সালেহা
এন্টারপ্রাইজ
মা
এন্টারপ্রাইজ
মেসার্স
বাহার
ষ্টোর
চায়না
ষ্ট্যারাইট
টি
ষ্টোর
লতান
এম.কে.
এন্টারপ্রাইজ

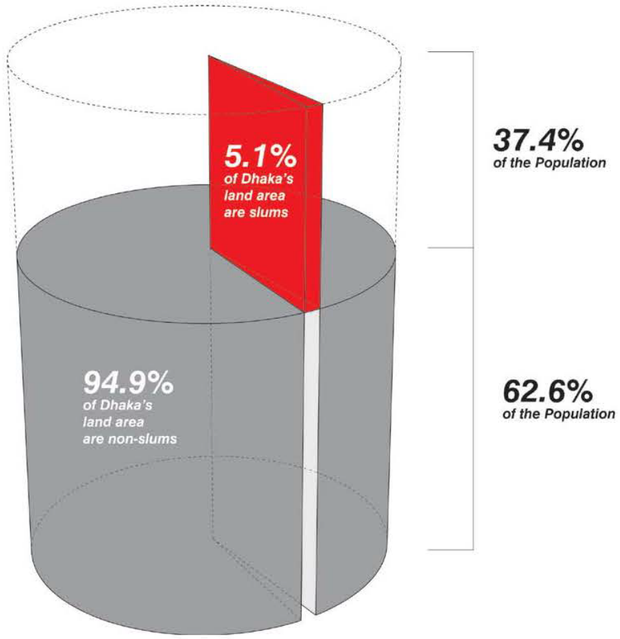

PRAN

Challenges to Urban Growth

Location of Slums *in Dhaka Metropolitan Area*

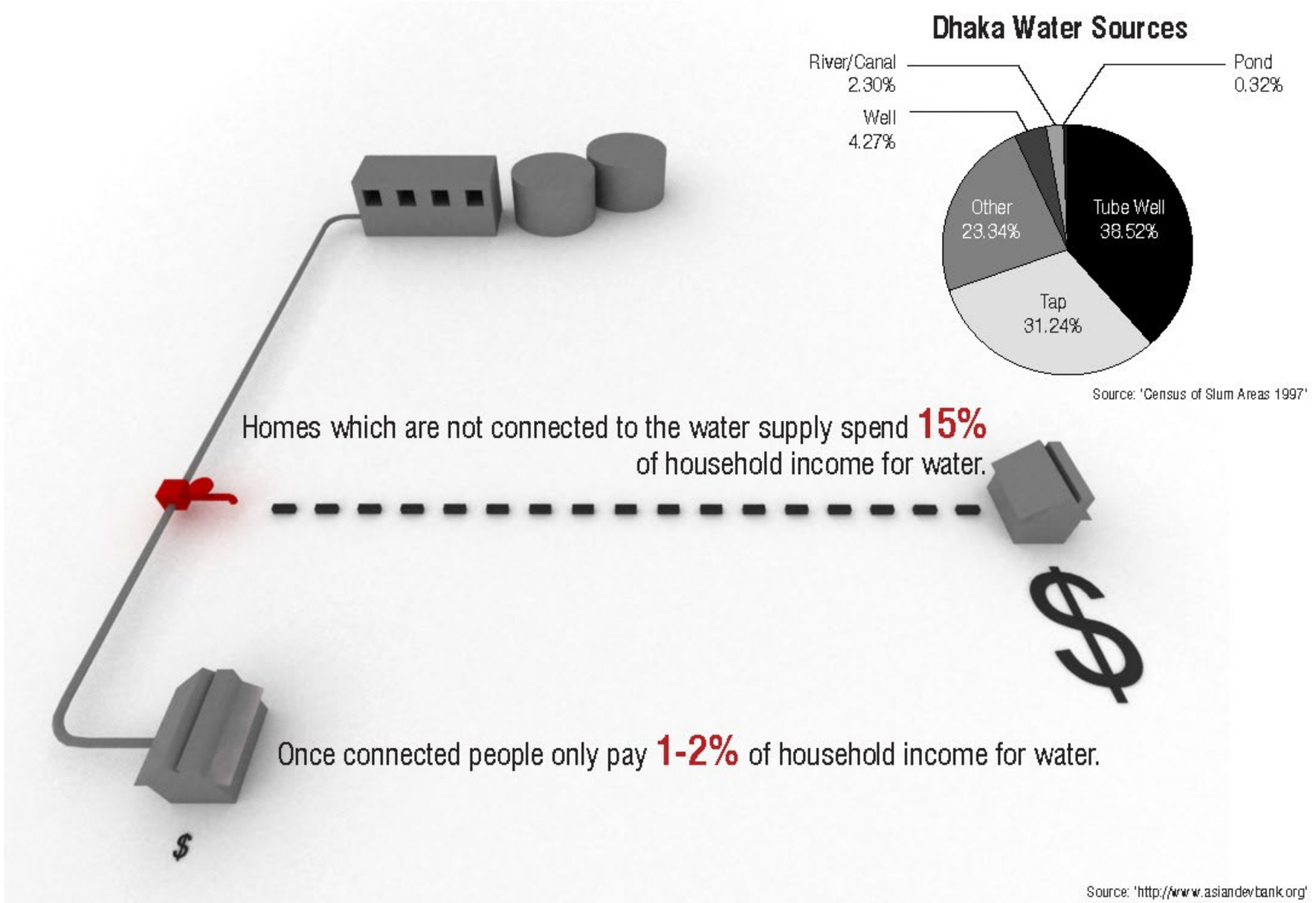


"In Dhaka, slums occupied 5.1 percent of the city's total land area but accomodated 37.4 percent of the population"

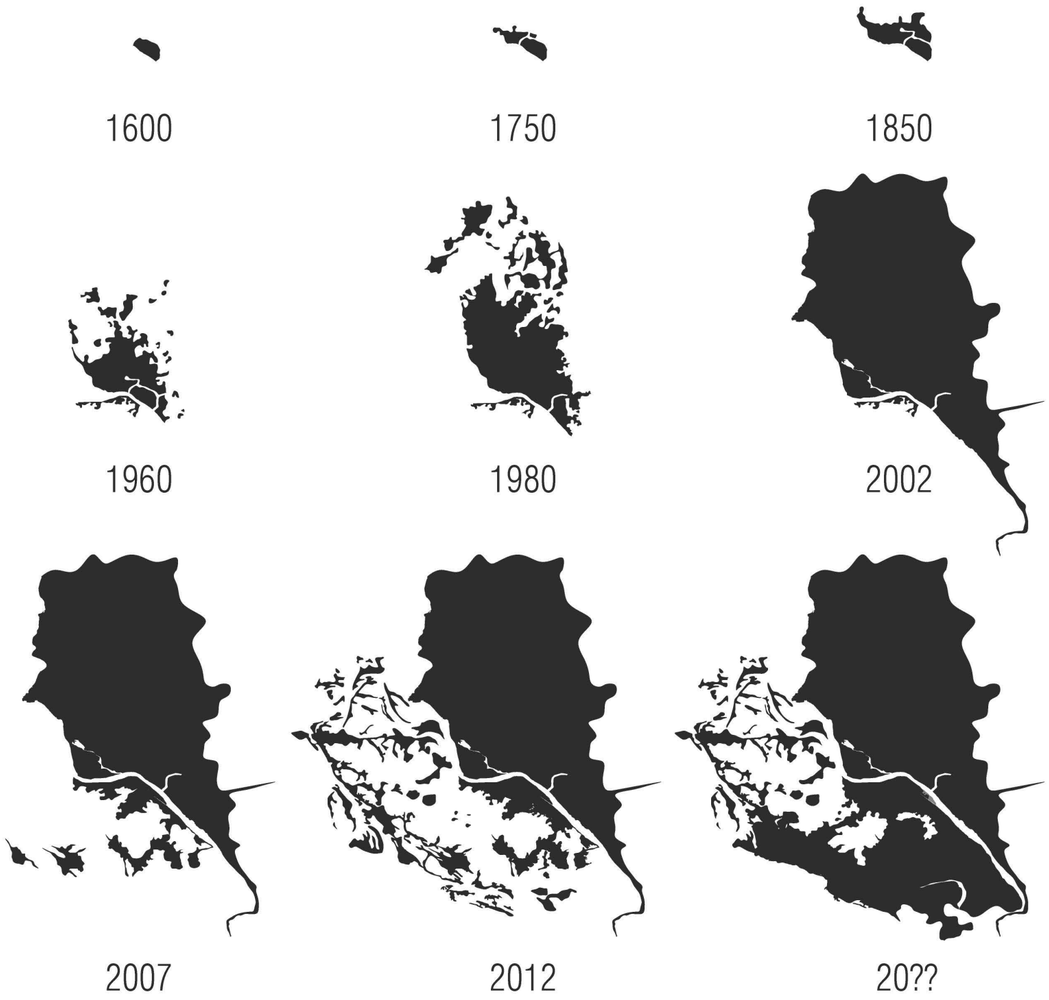


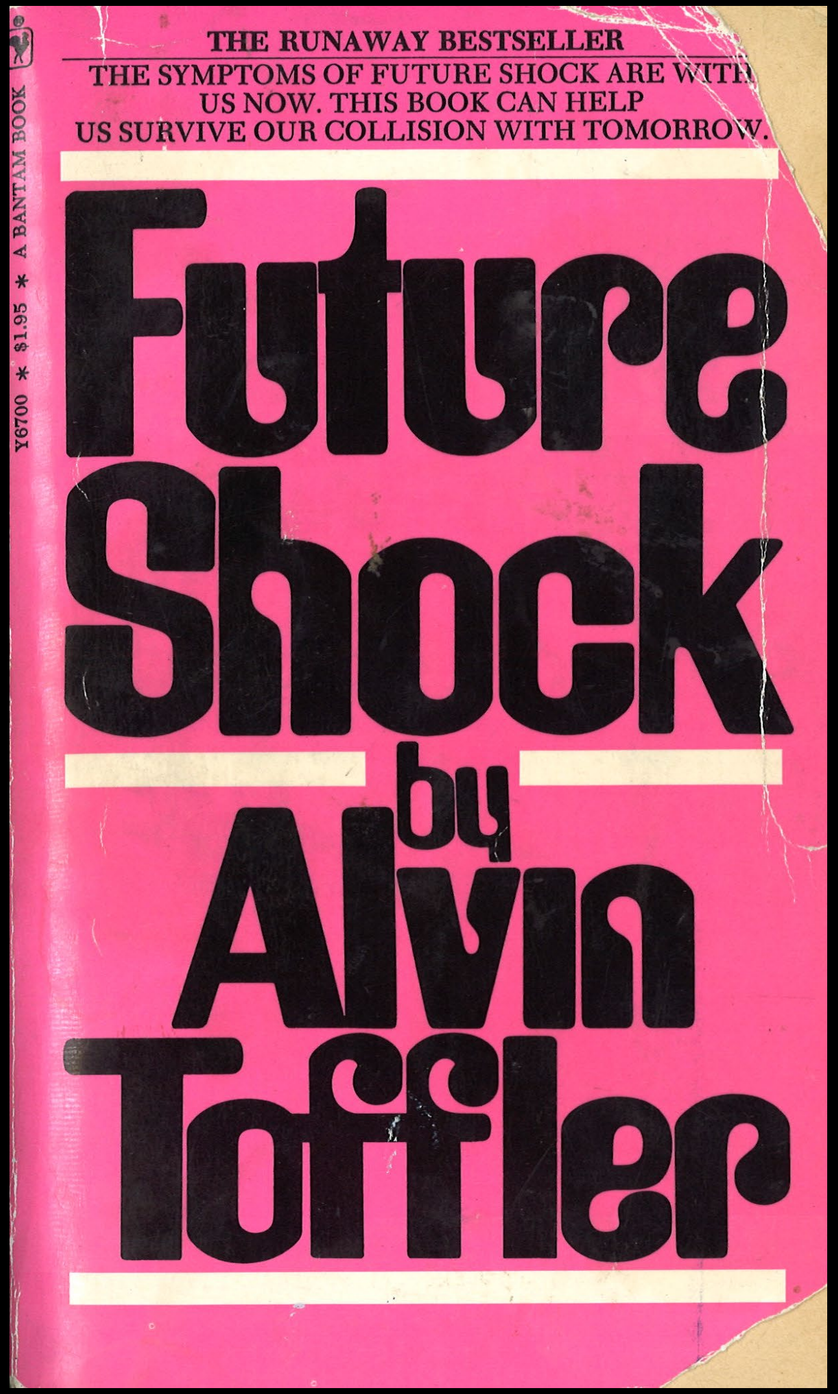
Sources: Data: Centre for Urban Studies, 2005.
Image Data: Centre for Urban Studies, 2005
Graphics: APF

CHALLENGES IN BANGLADESH: POTABLE WATER



HOW DOES DHAKA GROW IN THE FUTURE?




THE RUNAWAY BESTSELLER
THE SYMPTOMS OF FUTURE SHOCK ARE WITH
US NOW. THIS BOOK CAN HELP
US SURVIVE OUR COLLISION WITH TOMORROW.
Future Shock
by
Alvin Toffler
Y6700 * $1.95 * A BANTAM BOOK

‘FAST FORECASTS FOR 2050’

Most of the fish stocks that existed in 2015 are now extinct.
5 billion of the world's projected 9.7 billion people now live in water-stressed areas.
6 million people now die per year from complications with air pollution.
Neurotechnologies enable users to interact with their environment and other people by thought alone.
6.3 billion people will live in cities.

Robotics are involved in 50% of all construction projects in the US.

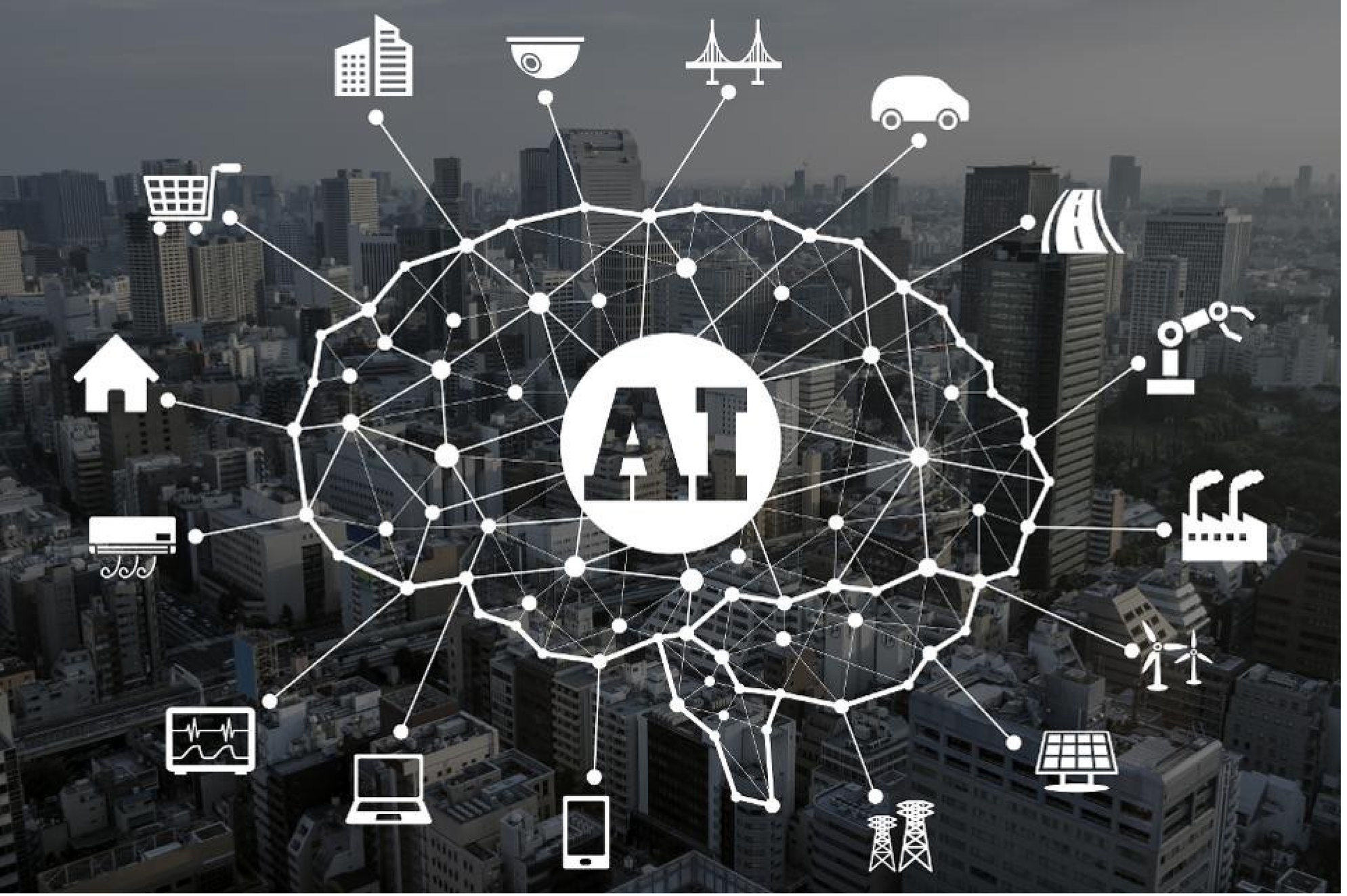
Coffee becomes a luxury due to climate change and the loss of suitable farming land
Skyscrapers (an arcology) that function as cities are built to address growing populations
Athabasca Glacier disappears by losing 5 metres per year since 2015
China's "South-to-North Water Transfer Project" is fully built

Share of global car sales taken by autonomous vehicles equals 90 per cent
(Moore's Law) Calculations per second, per $1,000, equals 10^23 (equal to all human brain power globally)
Average number of connected devices, per person, is 25

AI affects 4 out of 5 households in the US – assisting, doing, making

Worst case forecasted rise in global temperatures, above pre-industrial levels, is 2.5 degrees Celsius
Forecasted rise in global temperatures, above pre-industrial levels, is 2 degrees Celsius
Optimistic forecasted rise in global temperatures, above pre-industrial levels, is 1.89 degrees Celsius

Courtesy of Quantumrun Forecasting


AI


Tiger-Stone
TIGER-STONE

What is our agency?

How do we build sturdy and comfortable homes quickly?

Ideal Choice Homes

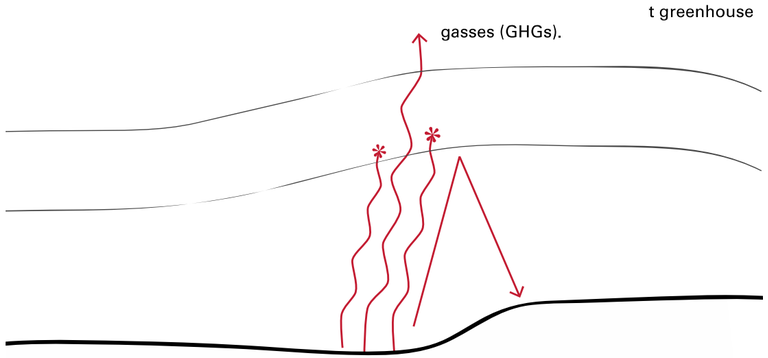
Philadelphia, PA + Ahmedabad, Pune & Mumbai, India
2011 - Ongoing

How do we measure environmental impact?

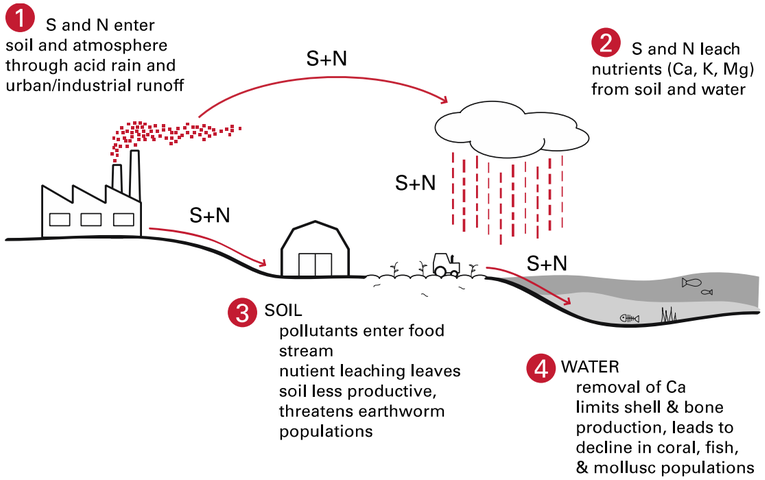
Tally

Worldwide
2011-Ongoing

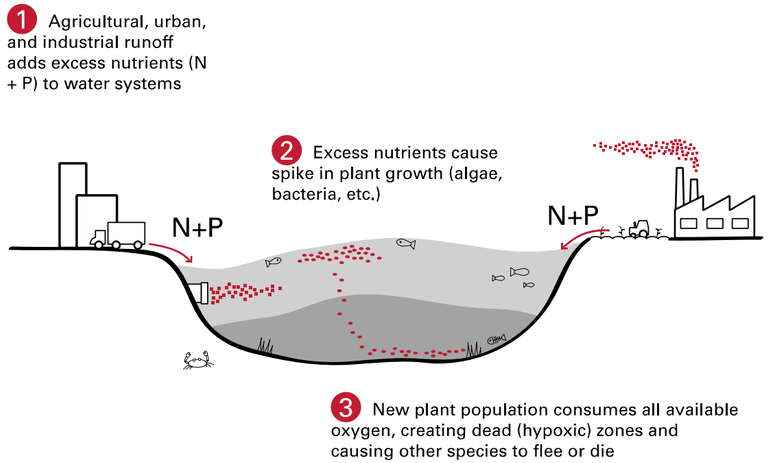
K. Simonen, *Life Cycle Assessment,* 2014



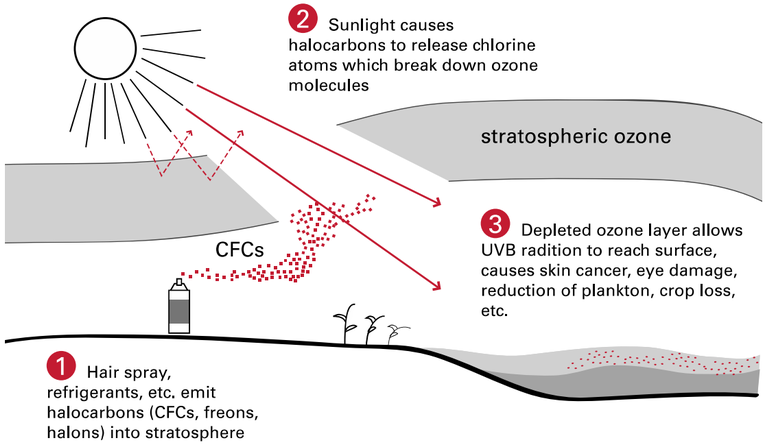
GLOBAL WARMING



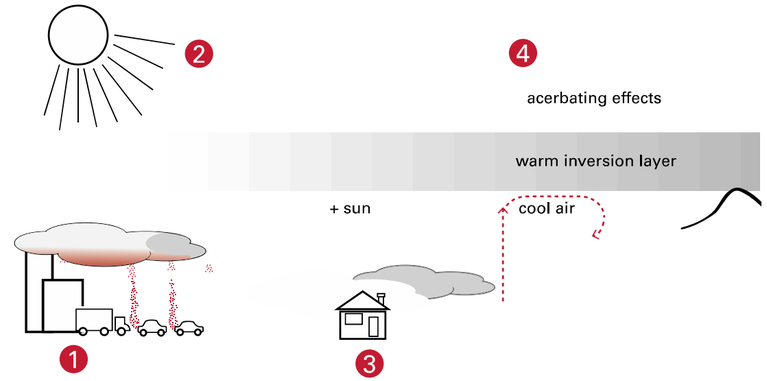
ACIDIFICATION



EUTROPHICATION



OZONE DEPLETION



SMOG

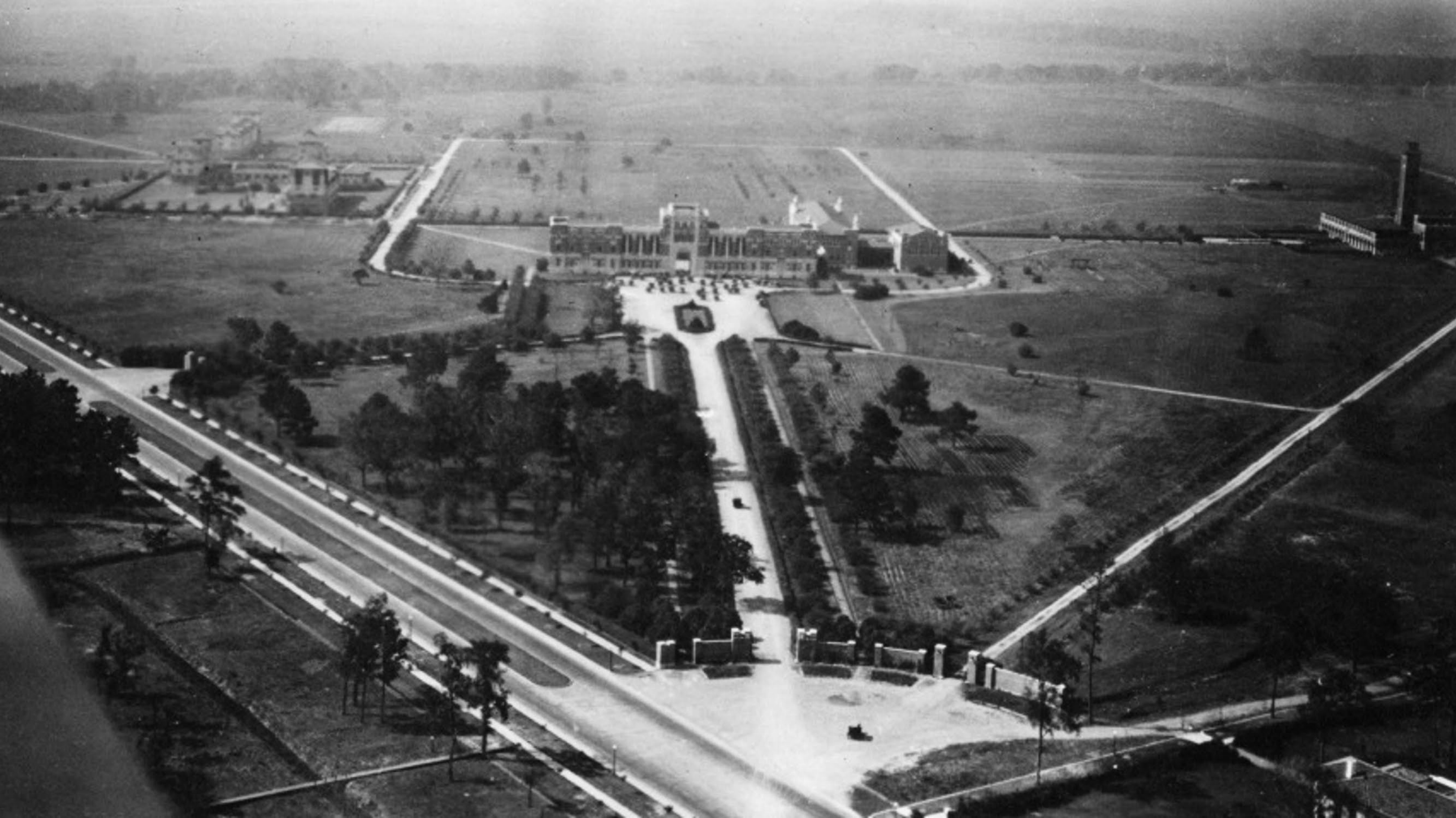
	Type	Example	Unit
Non-Renewable	Energy	Coal combustion for electricity	MJ
	Material	Crude oil as material input to plastic	MJ
Renewable	Energy	Bio-fuel	MJ
	Material	Wood burned in a furnace	MJ

PRIMARY ENERGY DEMAND

How do we balance physical, financial, political and functional systems in a framework for the future?

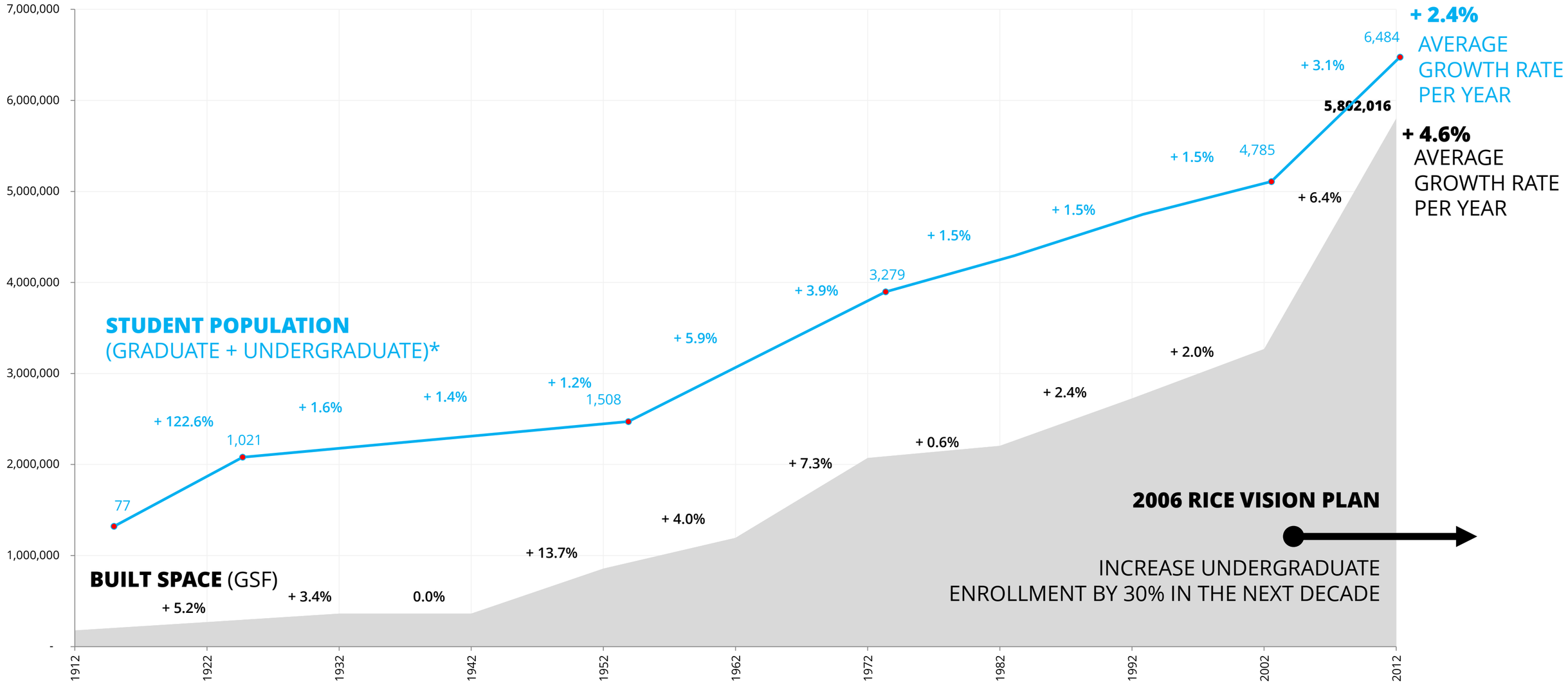
Rice Integrated Campus Planning

Houston, TX
2013-Ongoing



Rice Campus Historical Growth

Built Space + Student Population




RICE OWLS

Land Supply and Use Pressures

Buildings

Infrastructure

Circulation and Vehicular Parking

Open and Recreation Space

Stormwater Management

Administrative Decision Drivers

Institutional and Academic Ambitions

Needs, Opportunities, and Problem Solving

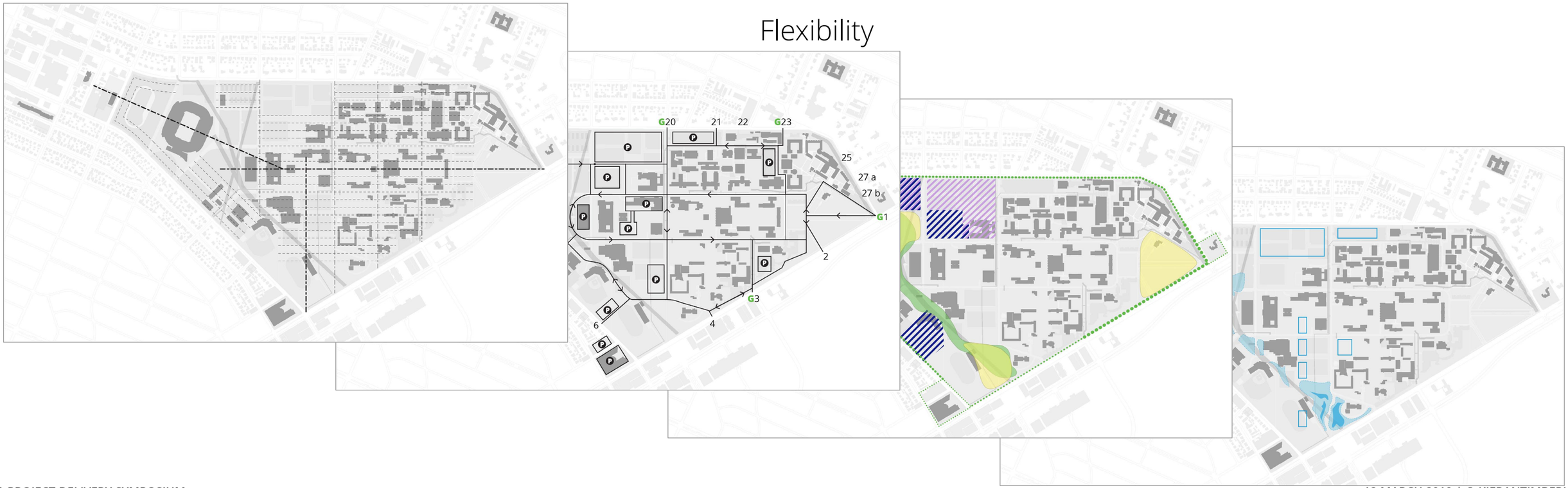
Resources and Constraints

Campus Character

Regulations

Risk Management

Flexibility



Base Case

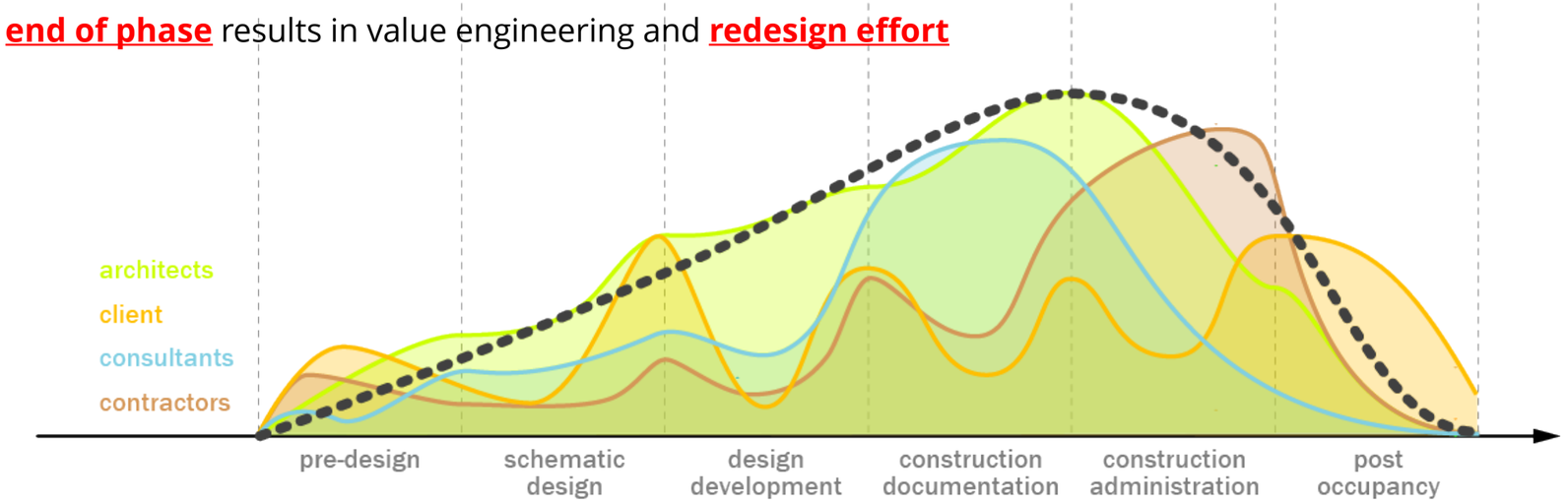
What are the spatial and temporal dynamics of urban open space?

Searching Across Months

A Changed Perspective

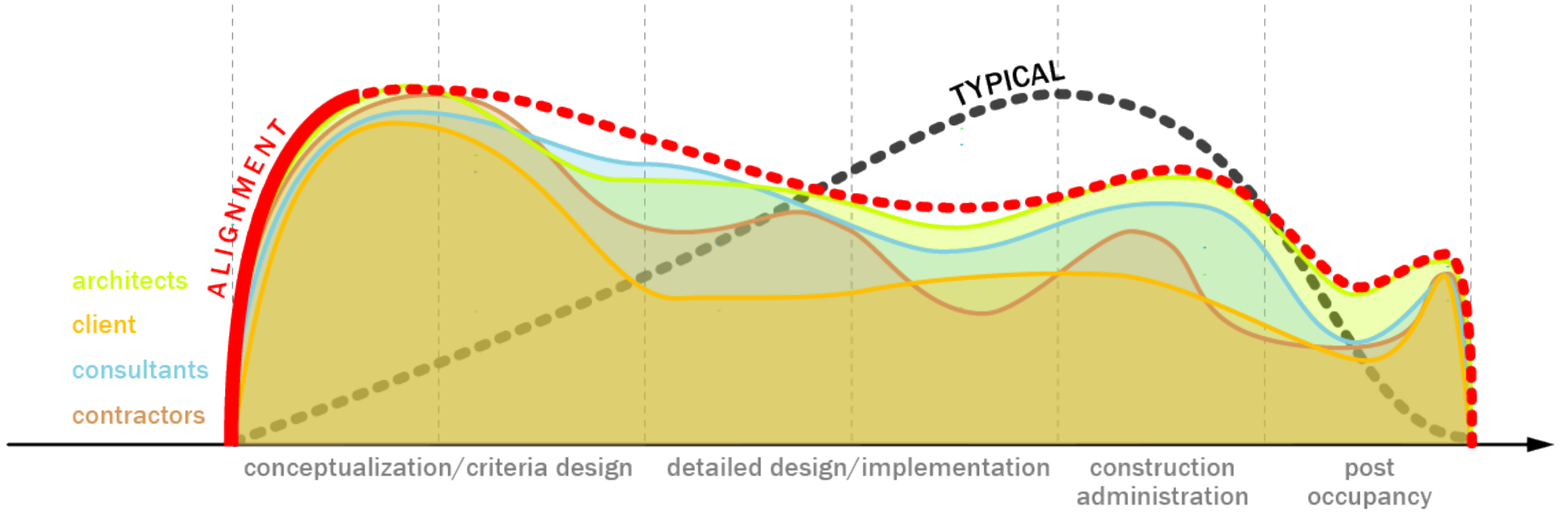
TRADITIONAL WORK PLAN

Cost estimating at **end of phase** results in value engineering and **redesign effort**



INTEGRATED WORK PLAN

Cost modeling to **inform design** results in **target value design**



KNOWLEDGE HOLDERS OVER TIME TYPICAL VERSUS IPD PROCESS

DESIGN BID BUILD [1]

New Science Building at University of Toronto
TBD

CONSTRUCTION MANAGER [7]

AS AGENT [2]

FASTC
AECOM
Iowa State University Innovation Center
JE Dunn

AT RISK [5]

University of Washington Student Housing
WG Clark
Harvard Lowell House
Consigli

EARLY CONTRACTOR INVOLVEMENT

UCSB Henley Hall
Sundt
New York University 181 Mercer
Turner

PARTIAL DESIGN BUILD

UCSF Minnesota Street Housing
Skanska

DESIGN BUILD [1]

University of Washington Student Housing, Oak Hall
TBD

INTEGRATED PROJECT DELIVERY [1]

Brown University Engineering and Research Center
Shawmut

BIG BANG

Pointelist
KT Innovations

Campus Planning Query
KT Innovations

WATERFALL

Tally
KT Innovations

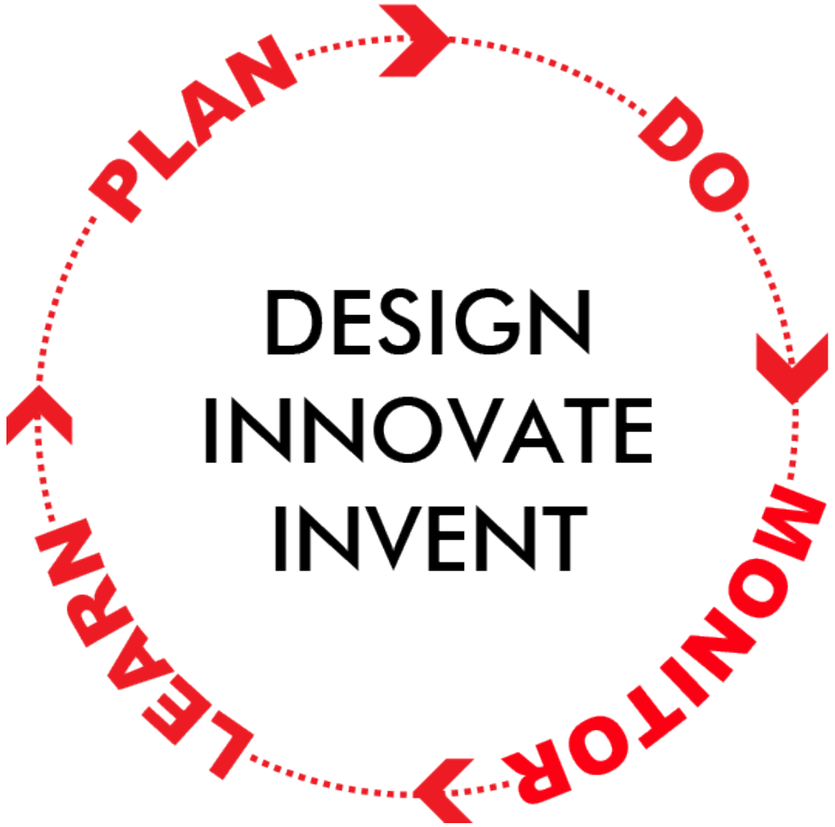
Ideal Choice Homes
KT India

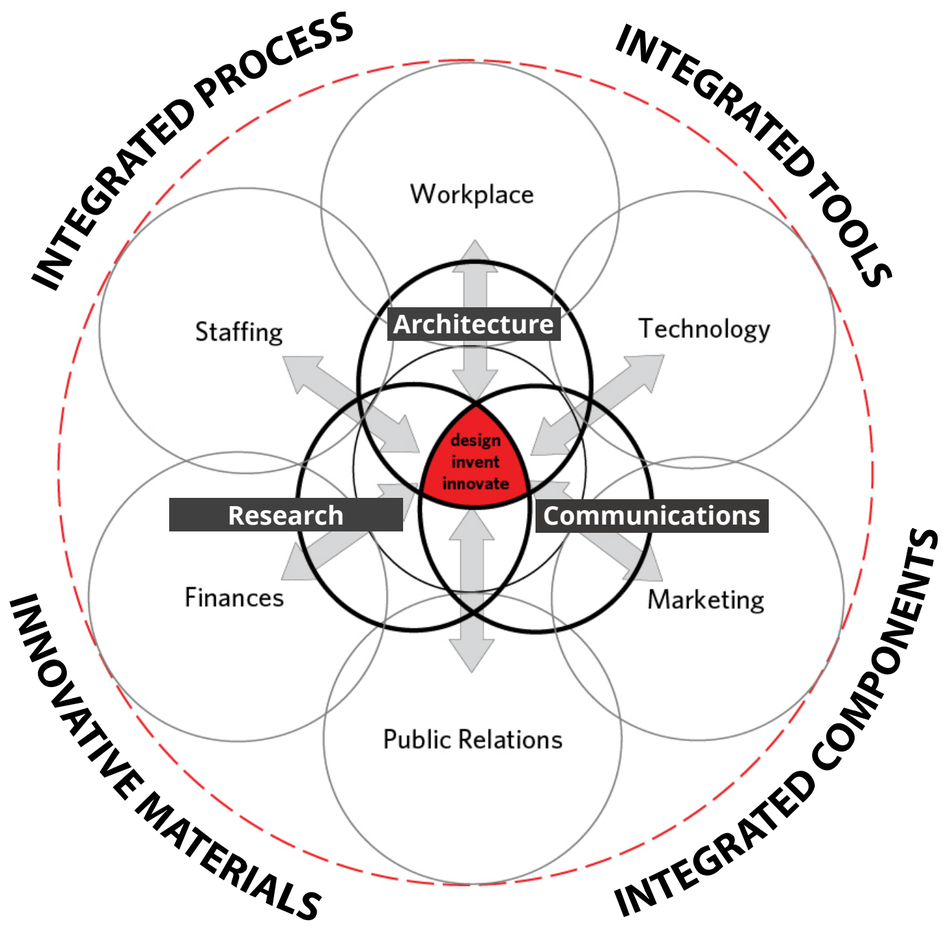
AGILE SCRUM

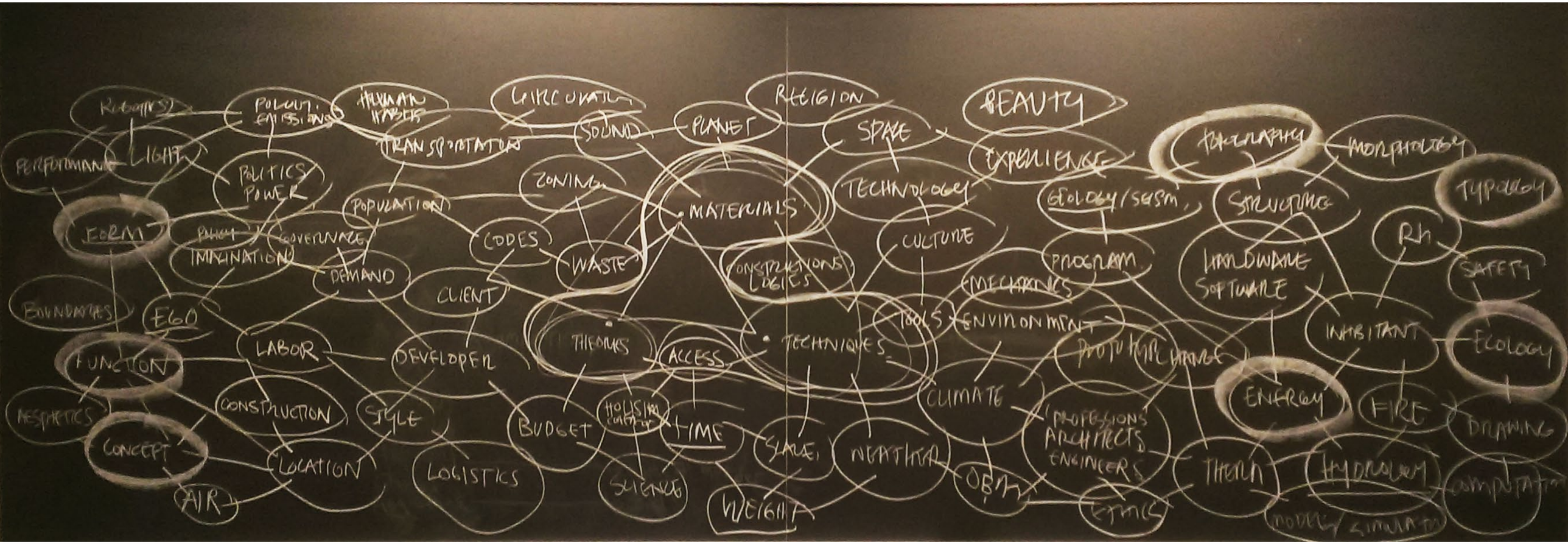
Roast
KT Innovations

Inclusivity and Diversity

Thinking Broadly


PLAN
DO
MONITOR
LEARN
DESIGN
INNOVATE
INVENT


INTEGRATED PROCESS
INTEGRATED TOOLS
INTEGRATED COMPONENTS
INNOVATIVE MATERIALS
Workplace
Staffing
Architecture
Technology
design
invent
innovate
Research
Communications
Finances
Marketing
Public Relations


ROBOTICS
POLLUTION EMISSIONS
HUMAN HABITS
CLIMATE
RELIGION
BEAUTY
PERFORMANCE
LIGHT
TRANSPORTATION
SOUND
PLANET
SPACE
EXPERIENCE
TOPOGRAPHY
MORPHOLOGY
POLITICS POWER
ZONING
MATERIALS
TECHNOLOGY
GEOLOGY/SEISM
STRUCTURE
TYPOLOGY
FORM
POPULATION
CODES
CULTURE
PROGRAM
RM
IMAGINATION
GOVERNANCE
WASTE
CONSTRUCTIONS LOGICS
KNOWLEDGE SOFTWARE
SAFETY
BOUNDARIES
EGO
DEMAND
CLIENT
TOOLS
ENVIRONMENT
INHABITANT
ECOLOGY
FUNCTION
LABOR
DEVELOPER
THEORIES
ACCESS
TECHNIQUES
PROTOTYPE
CLIMATE
ENERGY
FIRE
DRAWING
AESTHETICS
CONSTRUCTION
STYLE
BUDGET
HOLISTIC
TIME
PROFESSIONS ARCHITECTS ENGINEERS
CONCEPT
LOCATION
LOGISTICS
SCIENCE
SPACE
WEATHER
OBJECT
THERMAL
HYDROLOGY
DRAWING
AIR
WEIGHT
ETHICS
POWER/SIMULATION

An Expanded View

The duration of a project is...

36 months

PRE DESIGN

SCHEMATIC DESIGN

DESIGN DEVELOPMENT

CONSTRUCTION DOCUMENTATION

BID

CONSTRUCTION ADMINISTRATION

…dwarfed by that of an existing building…

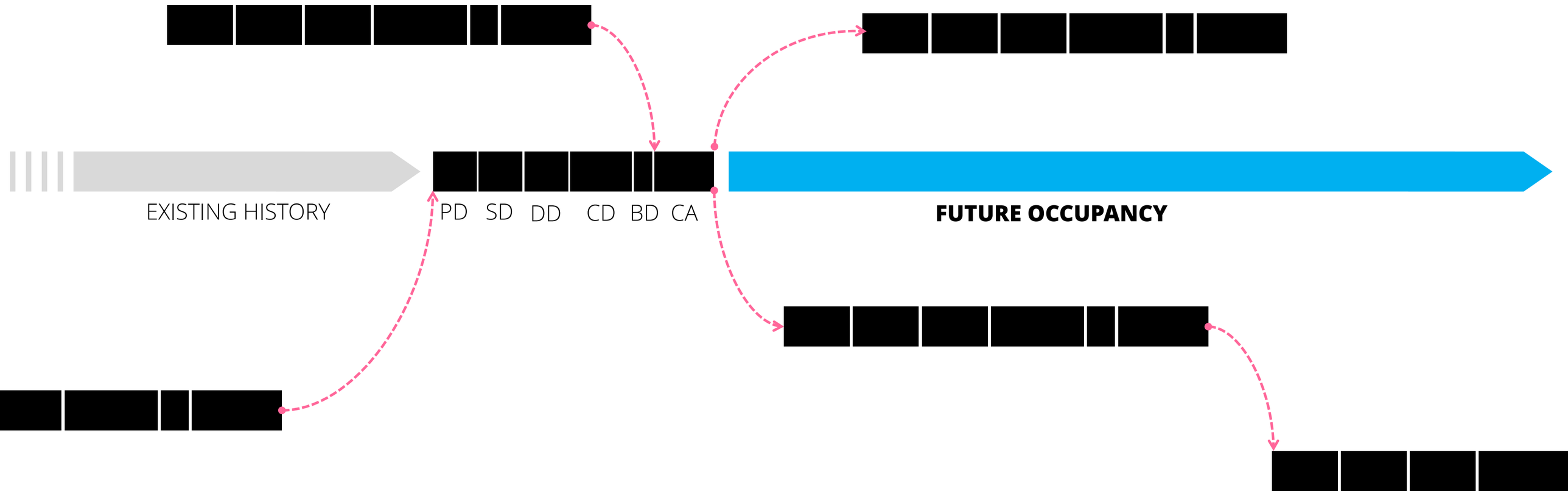
10, 25, 50 years?

…and if we are optimists, future occupancy.

25, 50, 100 years?

No project exists in isolation.

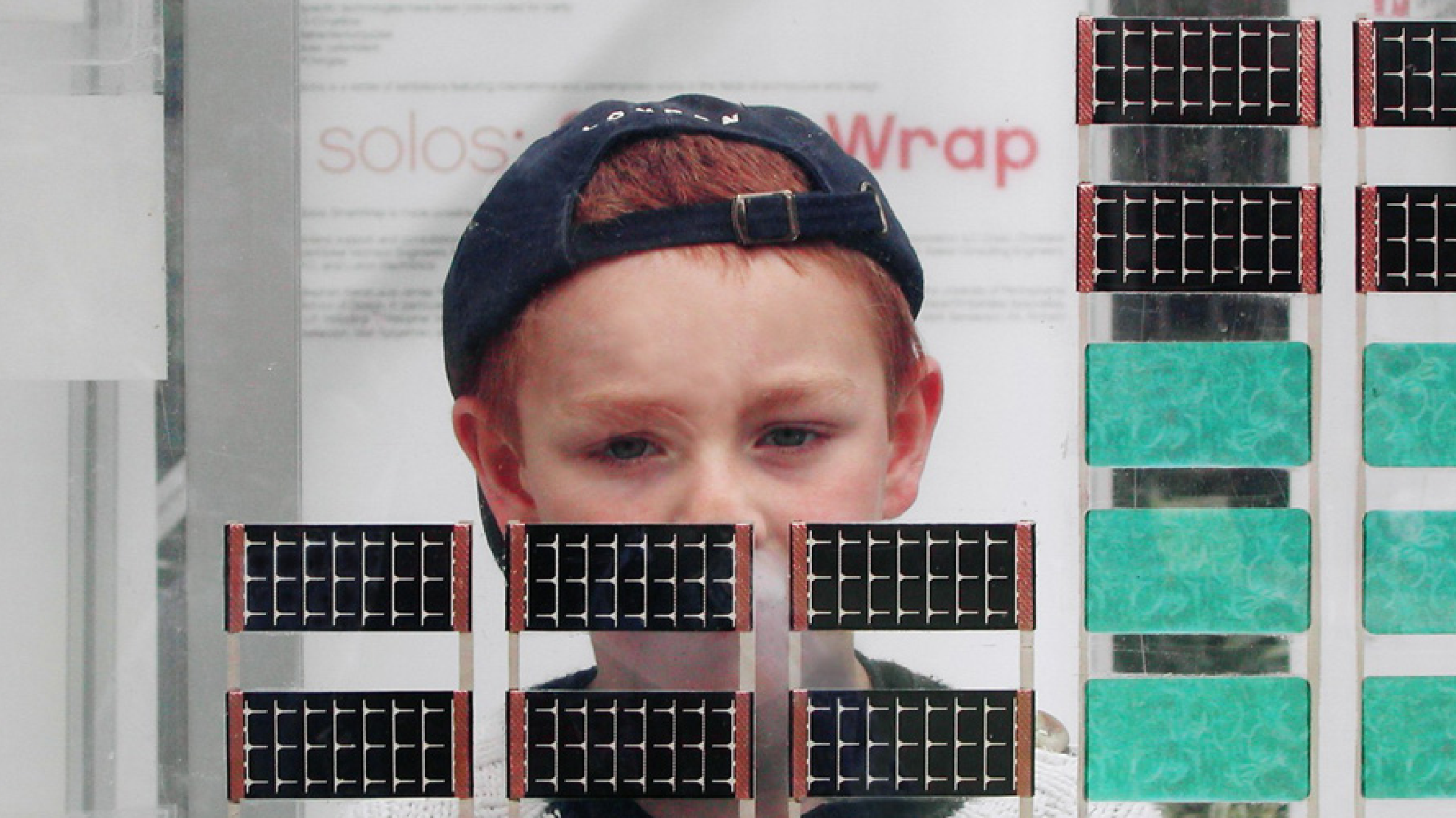
6 projects of varying states of completion



An Expanded Horizon

An Expanded Scope

An Expanded Scale


solos:
Wrap