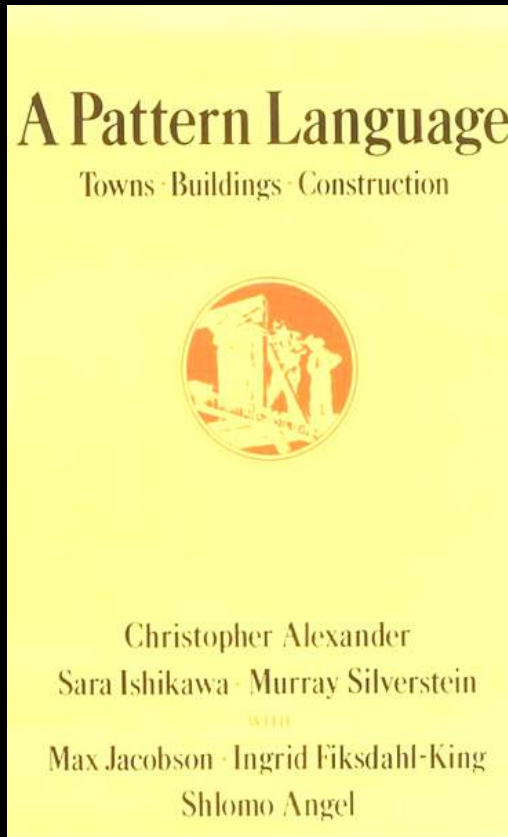


# HORIZONS OF PATTERN LANGUAGES:

## *Software, Cities, Planet*



*Michael W. Mehaffy*  
*Sustasis Foundation, Portland OR*



1.1 Roughness



1.2 Echoes



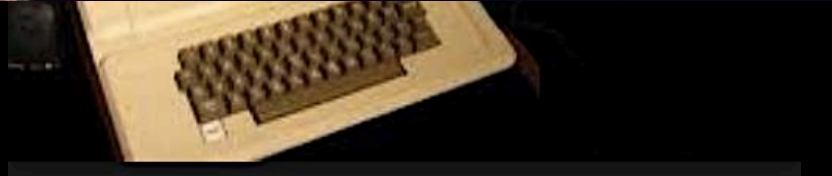
1.3 The Void



1.4 Inner Calm



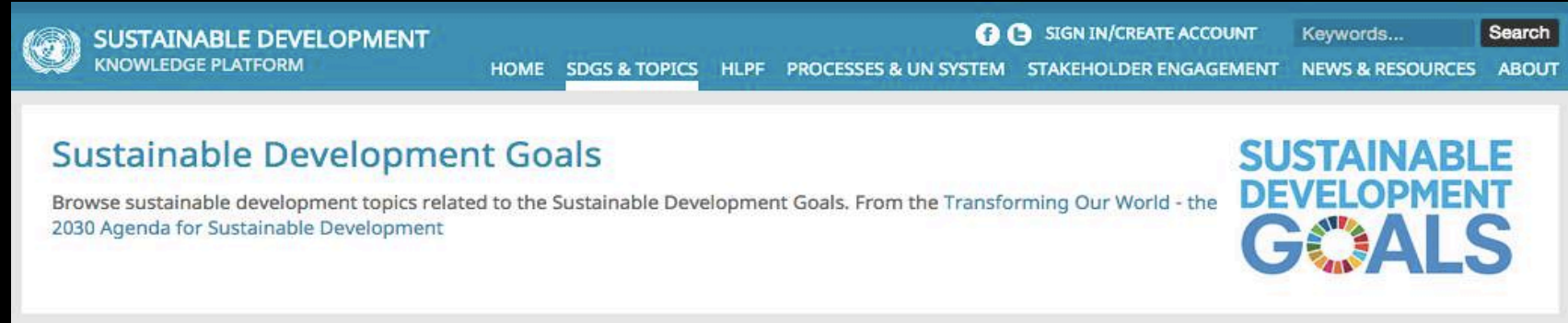
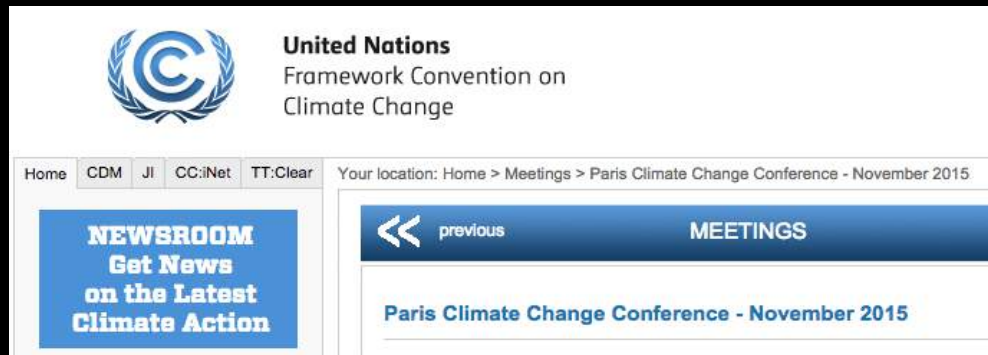
1.5 Non-Separateness



*2016 Habitat III conference  
outcome document:  
“New Urban Agenda”*



# One of several historic UN initiatives in last two years:



- COP21 Climate Negotiations (December 2015)
- Sustainable Development Goals (October 2015)
- Habitat III – defining the “New Urban Agenda” (October 2016)

# *The New Urban Agenda is linked to the Paris Climate Agreement*



*COP 21, December 2015*



*Habitat III, October 2016*


# Future of Places

The global forum about public space.

**71 Speakers** have participated during our 3 conferences.

 [SEE SPEAKERS](#)

**96 sessions** focused on urban development, placemaking and tackling societal challenges.

 [WATCH SESSIONS](#)

**77 Academic papers** with findings on past lessons, present opportunities and future challenges.

 [BROWSE DOCUMENTS](#)

## Challenges & Themes

"Cities have the capability of providing something for everybody, only because, and only when, they are created by everybody."

- Jane Jacobs

Today's rapid global urbanization carries **great challenges**, but also presents **great opportunities**. A problem that most city mayors are facing today is that the systems for building and managing cities – especially professional and legal systems – are

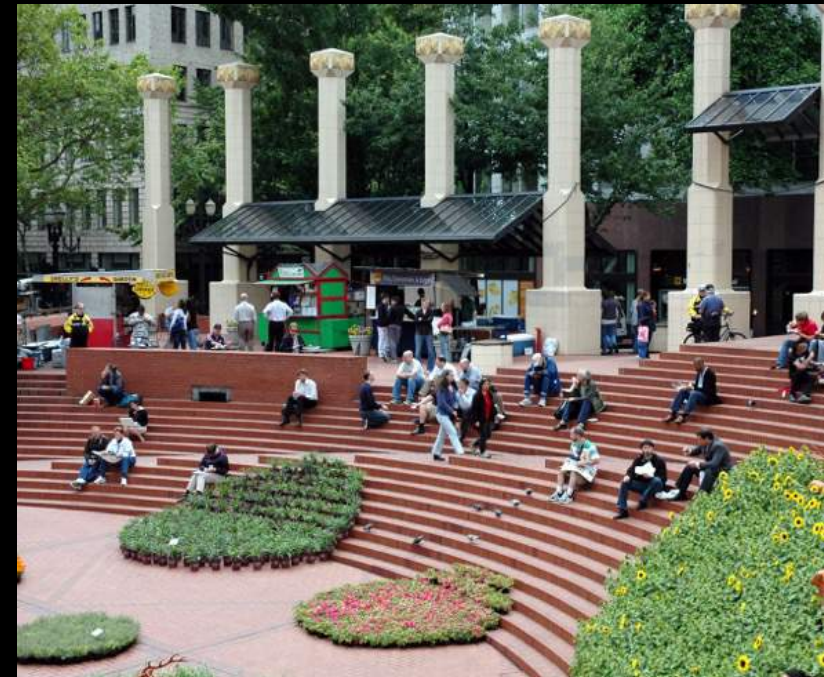
## Ax:son Johnson Foundation, UN Habitat and PPS

The Future of Places forum is arranged and financed by Axel and Margaret Ax:son Johnson foundation and has as collaborative partners UN Habitat and Project for Public Spaces.

The overall purpose is to elevate the importance of public space and placemaking in city planning at Habitat III 2016. The means are three international conferences (2013, 2014 and 2015), national

*...a collaborative platform for research, implementation, networking and advocacy (including) over 1,500 researchers, practitioners, officials and activists, representing more than 700 organizations, 275 cities and 100 countries from all around the world.*

# *The critical role of public space*



# *Center for the Future of Places: Focus on implementation*







*THE CHALLENGE: Rapid urbanization in many areas; often chaotic, fragmented, lacking in quality public spaces*



*Two parts: explosive growth of informal settlements ...*



*And “market-rate” development that is too sprawling, resource-intensive and high-emissions ...*



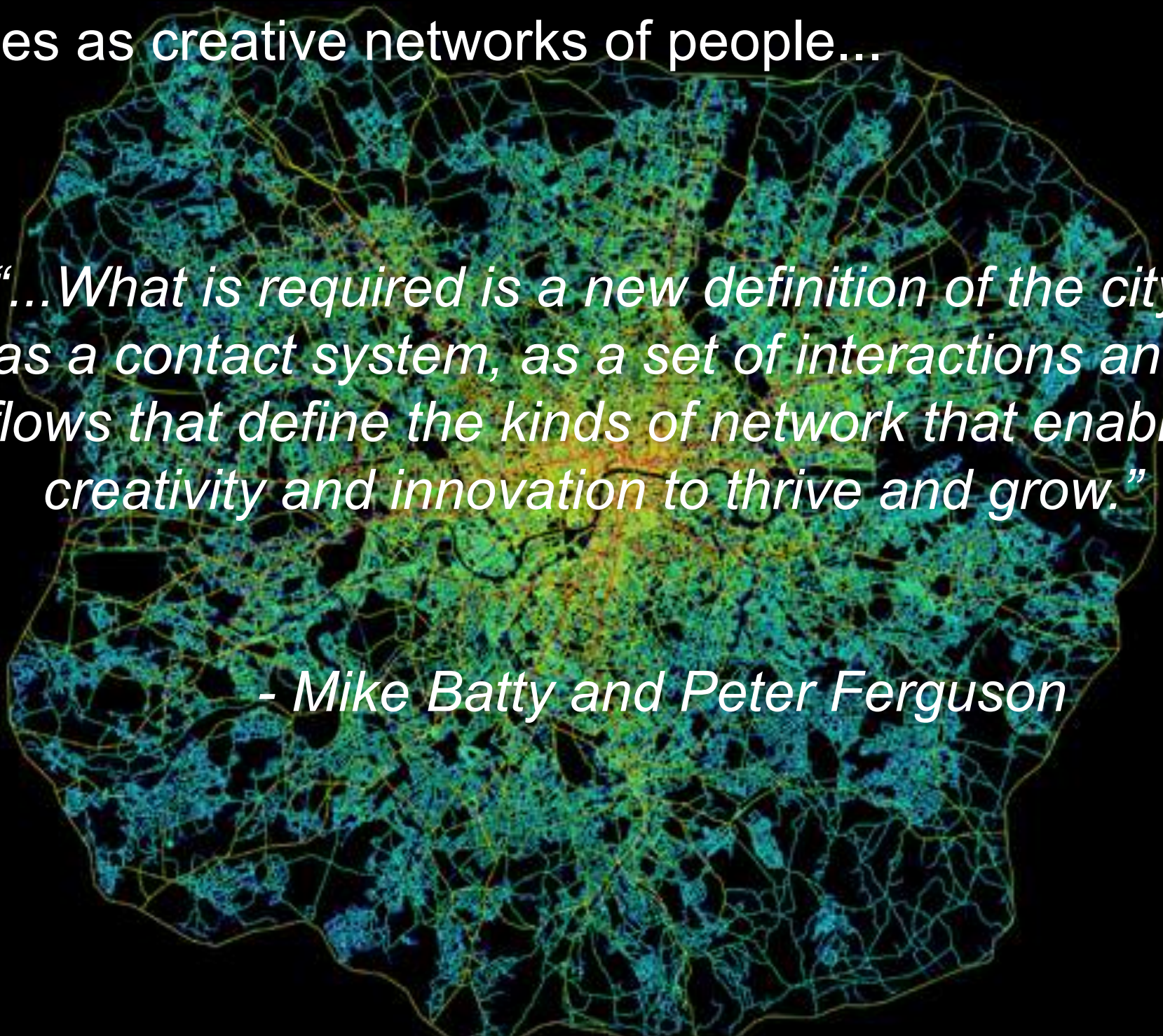
*In both cases, failing to fully provide what cities can...*



## Cities as creative networks of people...

*“...What is required is a new definition of the city, as a contact system, as a set of interactions and flows that define the kinds of network that enable creativity and innovation to thrive and grow.”*

*- Mike Batty and Peter Ferguson*



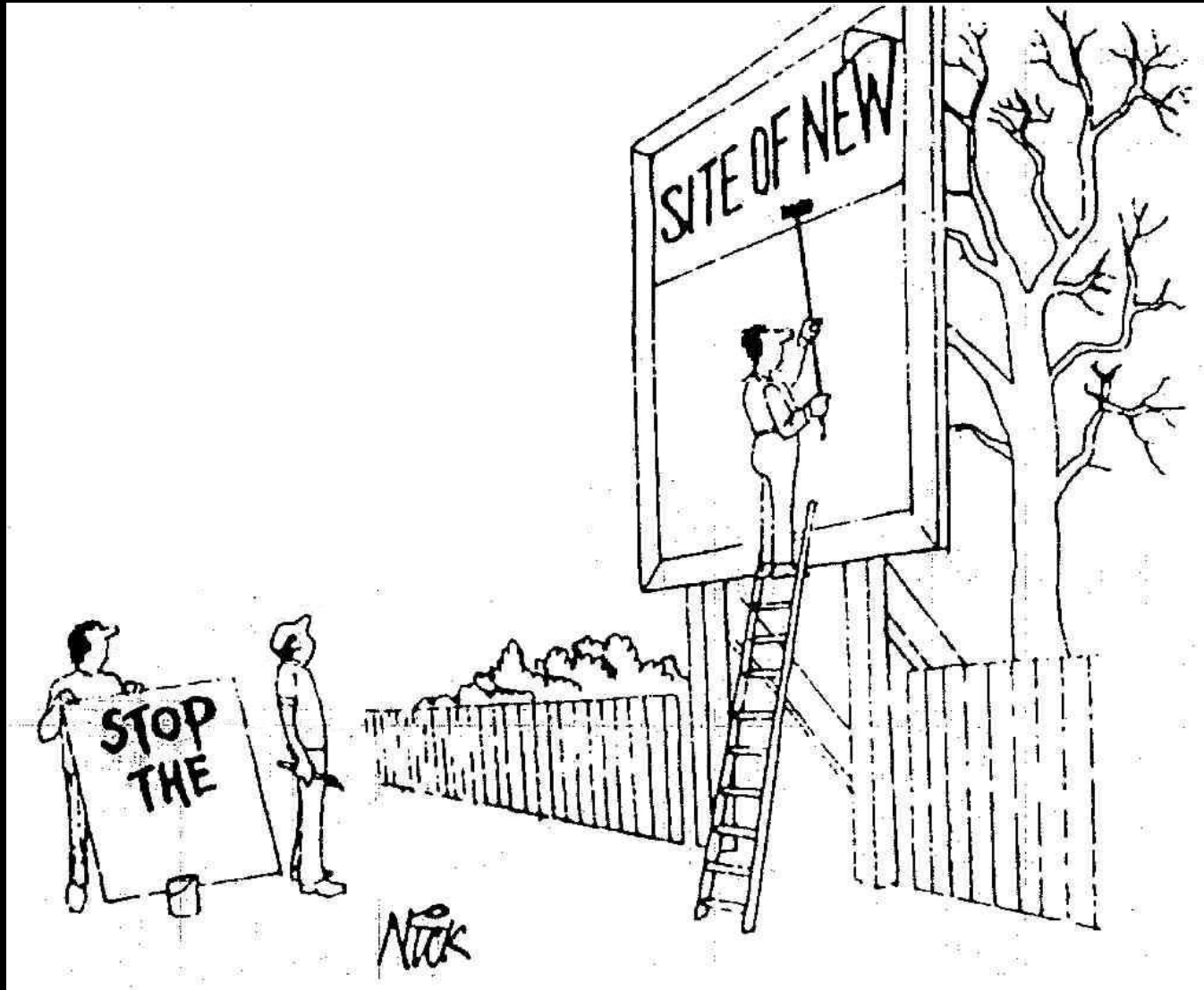


*The physical system of the city needs to connect us as agents that interact with one another...*

*We can use data networks, transportation systems and other systems, but the foundation is spatial networks, i.e. streets, squares, parks...*

*i.e. public space systems...*

*But there is a kind of “operating system for growth” that produces predictable results!*



*We need to reform this “operating system for growth...”*

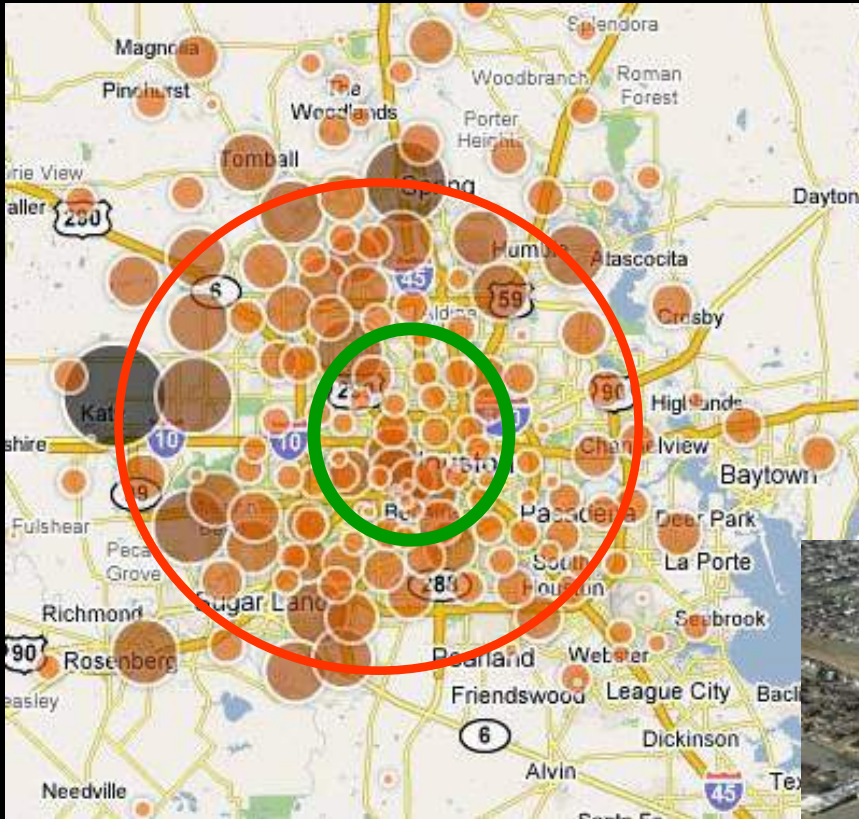




*Serious unexpected consequences –  
health, resource depletion, climate change...*



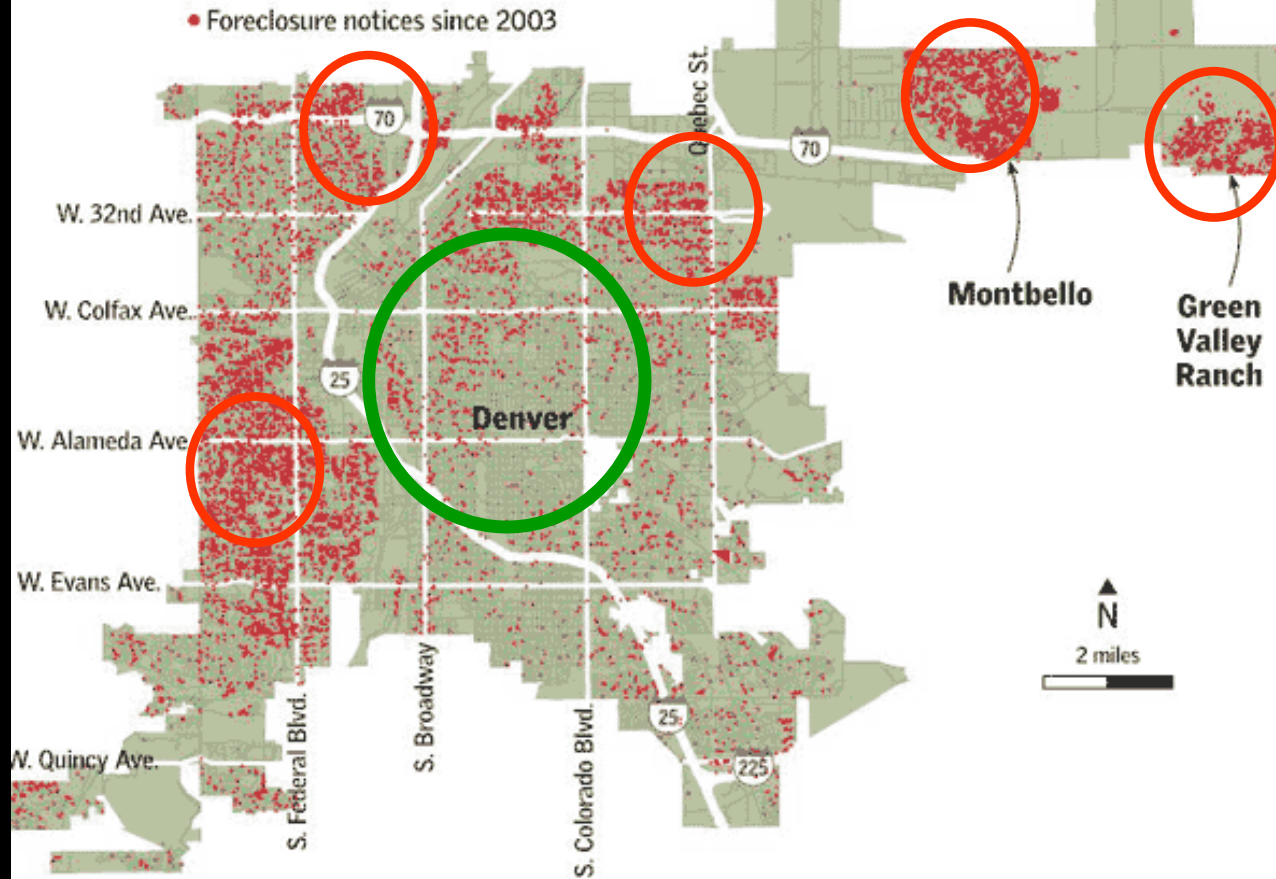
*And economics...*



*Calling into question  
our old model of  
economic growth”  
(based on waste)*

## Foreclosure notices ravage Denver neighborhoods

Nearly 11,000 foreclosure notices have been recorded in Denver from 2003 to May of this year. Two northeast Denver neighborhoods, Montbello and Green Valley Ranch, have been hit especially hard by foreclosures.



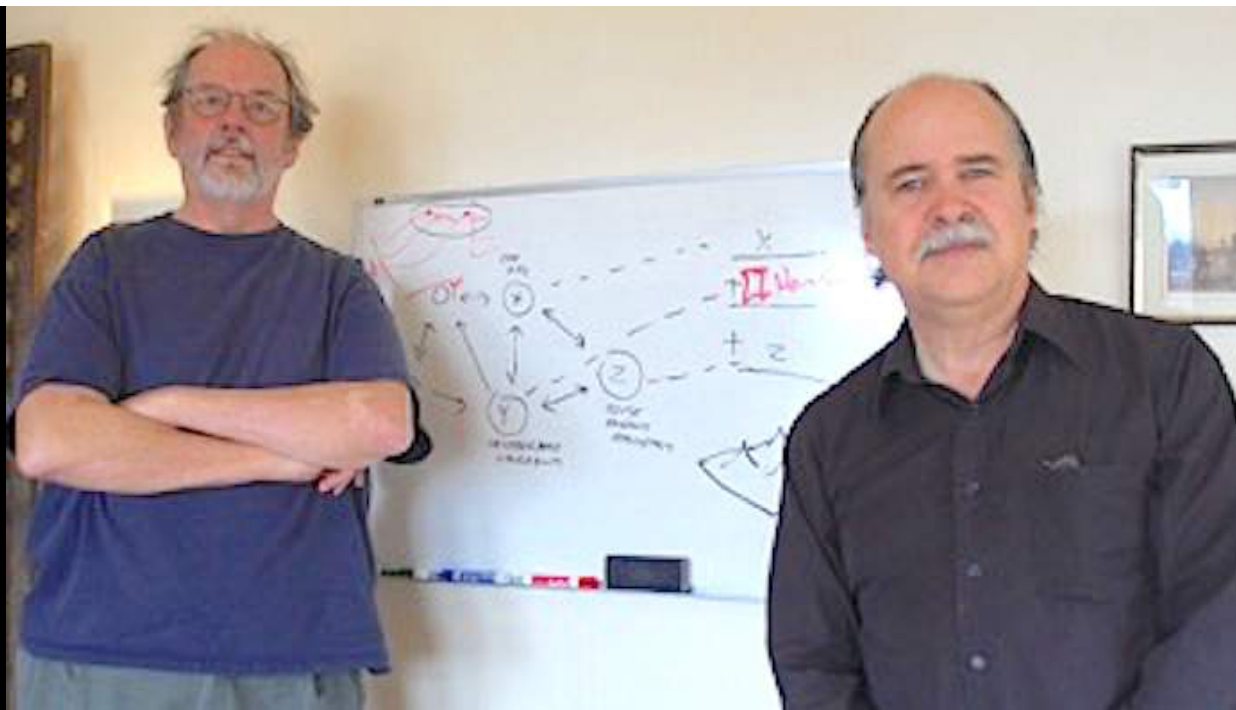
	Denver	Montbello	Green Valley Ranch
Median home sales price '01 *	\$179,500	\$172,250	\$185,302
Median home sales price '06 *	\$217,872	\$164,950	\$185,450
Homes lost to foreclosure, Aug. '03-Aug. '06	NA	977	414
Average listing price as of Nov. 15	\$368,314	\$175,647	\$212,298

August-October

Source: Denver Public Trustee's Office and Trulia.com

Jeffrey A. Roberts and Jeff Goertzen | The Denver Post

*We need new models of growth and economic development*



*So how we use technology to manage existing problems (and not create new ones!) is critical...*

*“I say I’m a technologist, but what I really am is a person who thinks about how people can work better together, using technology.”*

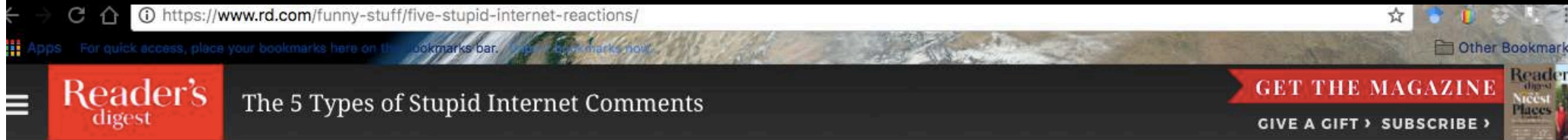
*- Ward Cunningham*

*Technē + Logos*

*“knowledge of making”*

*A conundrum...*

# Case 1: Typical Internet



## The 5 Types of Stupid Internet Comments

Many responses to online articles are reasoned and articulate, but then there are the rest. If the Internet had been around for 100 years, here's our guess at what the comments might have looked like for these major news stories.

BY DIANE DRAGAN

### From the Web

F21: YOU ARE AN IDIOT!

eb90: You moron.

F21: Go back where you  
ame from.

ng33: Shut up!

OL77: I HATE YOU!

F21: No one asked you.



Play this for 1 minute and see  
why everyone is addicted

Vikings: Free Online Game



What Doctors Don't Tell You  
About Snoring. Hint: There's  
A Better Solution Than A...

**YOU WON'T BELIEVE  
THE 5 STUPID THINGS  
YOU'LL CLICK ON**



**#3 WILL SHOCK YOU**



# Case 1: Typical Internet

"one of the dummer people on television"



Donald J. Trump  
@realDonaldTrump



Follow

I hear that dopey political pundit Lawrence O'Donnell, one of the **dummer** people on television, is about to lose his show-no ratings? Too bad



RETWEET

1

FAVORITE

1



Donald J. Trump  
@realDonaldTrump

Follow

All of the phony T.V. commercials against me are bought and **payed for** by SPECIAL INTEREST GROUPS, the bandits that tell your pols what to do

6:54 PM - 6 Mar 2016

6,892 Retweets 18,695 Likes



Donald J. Trump  
@realDonaldTrump



Wow, every poll said I won the debate last night. Great **honer!**

2/26/16, 5:48 AM

Dumbest Fails #60 | Internet Full of STUPID PEOPLE (2017)



Donald J. Trump  
@realDonaldTrump

Our great country has been divided for decades. Sometimes you need protest in order to **heel**, & we will heel, & be stronger than ever before!

2:33 / 9:13






# *Case 1: Typical Internet*

Donald Trump bodyslams, beats and shaves Vince McMahon at Wrestlemania XXIII



**Donald J. Trump** 

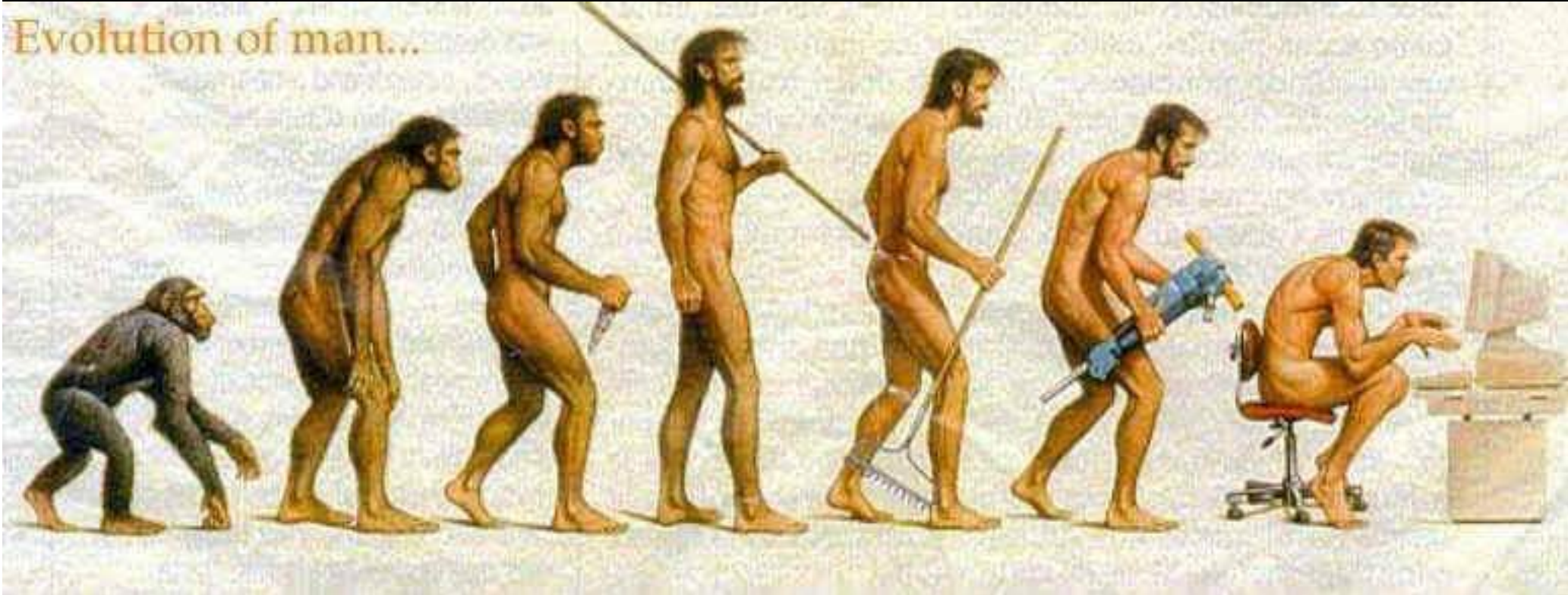
@realDonaldTrump

Just heard Foreign Minister of North Korea speak at U.N. If he echoes thoughts of Little Rocket Man, they won't be around much longer!

11:08 PM - 23 Sep 2017

# *Evolution?*

Evolution of man...



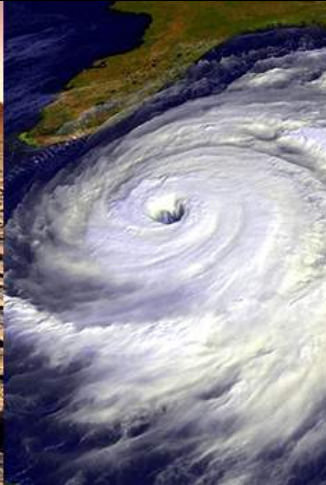
*Maybe not!*

*Edward Sapir,*

*“Culture: Genuine and Spurious”*

*“We have been in the habit of giving ourselves credit for essentially quantitative results that are due rather to an unusually favoring nature and to a favoring set of economic conditions than to anything in ourselves. Our victories have been brilliant, but they have also too often been barren for culture.”*

# *How can we work together to meet common challenges?*



*Climate Change*

*Inequality and Poverty*



*Etc...*

*Unsustainable Systems*

# *How can we work together to meet common challenges?*

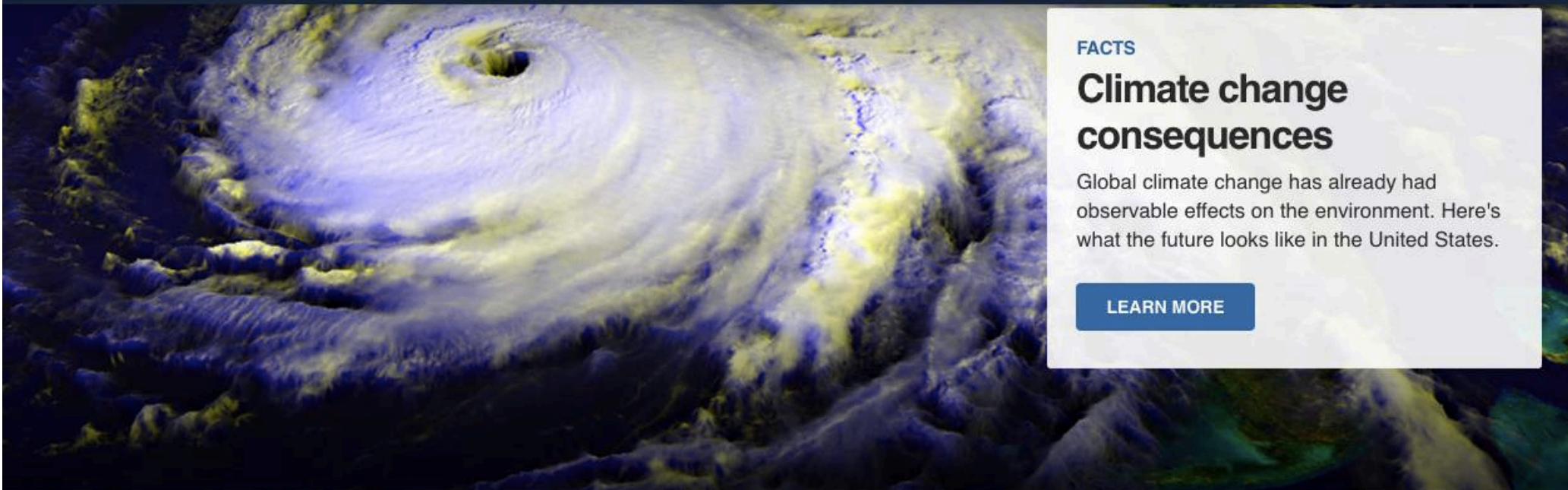
Secure | <https://climate.nasa.gov>

Apps For quick access, place your bookmarks here on the bookmarks bar. [Open](#) [Bookmarks now](#) Other



**GLOBAL CLIMATE CHANGE**  
Vital Signs of the Planet

[FACTS](#) [ARTICLES](#) [SOLUTIONS](#) [EXPLORE](#) [RESOURCES](#) [NASA SCIENCE](#)



FACTS

## Climate change consequences

Global climate change has already had observable effects on the environment. Here's what the future looks like in the United States.

[LEARN MORE](#)

CARBON DIOXIDE

↑ 406.94 parts per million

GLOBAL TEMPERATURE

↑ 1.7 °F since 1880

ARCTIC ICE MINIMUM

↓ 13.3 percent per decade

LAND ICE

↓ 286.0 Gigatonnes per year

SEA LEVEL

↑ 3.4 millimeters per year

# *How can we work together to meet common challenges?*

Secure | <https://climate.nasa.gov>

EXPLORE RESOURCES NASA SCIENCE

## Climate Change Scam Alert: Merchants of Fear Exposed!



The Arctic Ice Cap Grew The Same Year Al Gore Predicted It Would Disappear

Banksters Defraud Millions Th



### Global Warming Hoax Finally Falling Apart

CARBON DIOXIDE	GLOBAL TEMPERATURE
↑ 406.94 parts per million	↑ 1.7 °F since 1880

# *How can we work together to meet common challenges?*

The image shows a screenshot of a NASA website. The main header reads "Climate Change Scam Alert: Merchants" with navigation links for "EXPLORE", "RESOURCES", and "NASA SCIENCE". A browser address bar shows the URL "https://climate.nasa.gov". An embedded article from Politico is displayed, with the URL "www.politico.com/story/2017/04/donald-trump-kathleen-hartnett-white-climate-skeptic-job-237172". The article title is "Trump eyes climate skeptic for key White House environmental post" by Alex Guillén and Andrew Restuccia, dated 04/12/2017 06:00 PM EDT. The article text discusses President Donald Trump's potential appointment of Kathleen Hartnett White as the highest-ranking environmental official in the White House. A sidebar on the left contains social media sharing options for Facebook, Twitter, and Google+, as well as Email, Comment, and Print buttons. A partial "CARBON DIOXIDE" chart is visible at the bottom left, showing an upward trend to 406.9. A small "White House officials brought White in" text is partially visible at the bottom right.

Secure | <https://climate.nasa.gov>

Climate Change Scam Alert: Merchants

EXPLORE RESOURCES NASA SCIENCE

[www.politico.com/story/2017/04/donald-trump-kathleen-hartnett-white-climate-skeptic-job-237172](http://www.politico.com/story/2017/04/donald-trump-kathleen-hartnett-white-climate-skeptic-job-237172)

Facebook Twitter Google+

Email Comment Print

## Trump eyes climate skeptic for key White House environmental post

By ALEX GUILLÉN and ANDREW RESTUCCIA | 04/12/2017 06:00 PM EDT

Share on Facebook Share on Twitter

President Donald Trump may tap a vocal critic of climate change science to serve as the highest-ranking environmental official in the White House.

Kathleen Hartnett White, who says carbon emissions are harmless and should not be regulated, is a top contender to run the Council on Environmental Quality, the White House's in-house environmental policy shop, sources close to the administration told POLITICO.

White House officials brought White in

CARBON DIOXIDE

↑ 406.9

# *How can we work together to meet common challenges?*

Secure | <https://climate.nasa.gov>

Climate Change Scam Alert: Merchants

EXPLORE RESOURCES NASA SCIENCE

[www.politico.com/story/2017/04/donald-trump-kathleen-hartnett-white-climate-skeptic-job-237172](https://www.politico.com/story/2017/04/donald-trump-kathleen-hartnett-white-climate-skeptic-job-237172)

Facebook  
Twitter  
Google+

## Trump eyes climate skeptic for key White House environmental post

EPA" and pushed back against stricter limits on air and water pollution. She is a senior fellow at the Texas Public Policy Foundation, a conservative think-tank that has received funding from fossil-fuel companies that include Koch Industries, ExxonMobil and Chevron.

406.9

be regulated, is a top contender to run the Council on Environmental Quality, the White House's in-house environmental policy shop, sources close to the administration told POLITICO.

White House officials brought White in



# Case 2: Wikipedia



WIKIPEDIA  
The Free Encyclopedia

Main page  
Contents  
Featured content  
Current events  
Random article  
Donate to Wikipedia  
Wikipedia store

Interaction

Help  
About Wikipedia  
Community portal  
Recent changes  
Contact page

Tools

What links here  
Related changes  
Upload file  
Special pages  
Permanent link  
Page information

Not logged in Talk Contributions Create account Log in

Main Page Talk

Read View source View history Search Wikipedia

## Welcome to Wikipedia,

the free encyclopedia that anyone can edit.  
5,492,612 articles in English

- Arts
- Biography
- Geography
- History
- Mathematics
- Science
- Society
- Technology
- All portals

### From today's featured article



The **Battle of Hastings** was fought on 14 October 1066 between the Norman-French army of **William, the Duke of Normandy**, and an English army under the Anglo-Saxon King **Harold Godwinson**, about 7 miles (11 kilometres) northwest of **Hastings**. The death of the childless King **Edward the Confessor** in January of that year

led to a bloody struggle for the throne. After Harold defeated his own brother **Tostig** and the Norwegian King **Harald Hardrada** at the **Battle of Stamford Bridge** in September, William landed his invasion forces in the south of England at **Pevensey**. Harold marched swiftly to meet him, gathering forces as he went. The English army, with perhaps 10,000 **infantry**, met an invading force of perhaps 3,500 infantry and 3,500 **cavalry** and archers. After failing to break the English battle lines, the Normans pretended to flee in panic, then turned on their pursuers. Harold's death, probably near the end of the battle, led to the retreat and defeat of most of his army and to the **Norman conquest of England**. William was crowned as king on Christmas Day 1066.

**(Full article...)**

Recently featured: **Ben Paschal** · **Saturn** · **Fork-marked lemur**

### In the news

- Flash floods and landslides from a **tropical depression** (*satellite image pictured*) kill more than 50 people in Vietnam.
- **Wildfires** in Northern California kill at least 31 people and destroy thousands of buildings and other structures.
- **Richard Thaler** is awarded the Nobel Memorial Prize in Economic Sciences.
- **Hurricane Nate** kills at least 45 people across **Central America** and in the **United States**, primarily due to flooding and landslides.
- **Kazuo Ishiguro** is awarded the Nobel Prize in Literature.
- **Jeffrey C. Hall**, **Michael Rosbash**, and **Michael W. Young** share the Nobel Prize in Physiology or Medicine for their discoveries of molecular mechanisms controlling the circadian rhythm.



Tropical Depression 23W

**Other recent events**

## What's the difference?

# Case 2: Wikipedia

Secure | [https://www.google.se/search?q=Battle+of+Hastings&aq=Battle+of+Hastings&gs\\_l=psy-ab.3..0l10.26409.29498.0.29763.18.18.0.0.0.135...](https://www.google.se/search?q=Battle+of+Hastings&aq=Battle+of+Hastings&gs_l=psy-ab.3..0l10.26409.29498.0.29763.18.18.0.0.0.135...)

Google Battle of Hastings

All Images Maps Videos News More Settings Tools

About 18 100 000 results (0,82 seconds)


**Battle of Hastings - Wikipedia**  
[https://en.wikipedia.org/wiki/Battle\\_of\\_Hastings](https://en.wikipedia.org/wiki/Battle_of_Hastings)  
The **Battle of Hastings** was fought on 14 October 1066 between the Norman-French army of William, the Duke of Normandy, and an English army under the ...  
Battle, East Sussex · Bayeux Tapestry · Alan Rufus · Battle of Fulford

**The Battle of Hastings - Oct 14, 1066 - HISTORY.com**  
[www.history.com/this-day-in-history/the-battle-of-hastings](http://www.history.com/this-day-in-history/the-battle-of-hastings)  
King Harold II of England is defeated by the Norman forces of William the Conqueror at the **Battle of Hastings**, fought on Senlac Hill, seven miles from **Hastings**, England. ... In January 1066, King Edward died, and Harold Godwine was proclaimed King Harold II. ... On October 13, Harold ...

**Battle of Hastings - British History - HISTORY.com**  
[www.history.com/topics/british-history/battle-of-hastings](http://www.history.com/topics/british-history/battle-of-hastings)  
On October 14, 1066, at the **Battle of Hastings** in England, King Harold II (c.1022-66) of England was defeated by the Norman forces of William the Conqueror (c.1028-87). ... He was the last Anglo-Saxon king of England, as the battle changed the course of history and established the ...

**What Happened at the Battle of Hastings | English Heritage**  
[www.english-heritage.org.uk/learn/1066-and-the.../what-happened-battle-hastings/](http://www.english-heritage.org.uk/learn/1066-and-the.../what-happened-battle-hastings/)  
In the early morning of 14 October 1066, two great armies prepared to fight for the throne of England – the forces of King Harold, and the troops of Duke William ...


**Battle of Hastings**



The Battle of Hastings was fought on 14 October 1066 between the Norman-French army of William, the Duke of Normandy, and an English army under the Anglo-Saxon King Harold Godwinson, beginning the Norman conquest of England. **Wikipedia**

**Location:** Battle near Hastings, East Sussex, England  
**Date:** October 14, 1066  
**Result:** Decisive Norman victory  
**Combatants:** Normans, United Kingdom, Anglo-Saxons, Franks, Bretons

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The Free Encyclopedia

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# Global warming conspiracy theory

From Wikipedia, the free encyclopedia

A **global warming conspiracy theory** invokes claims that the [scientific consensus on global warming](#) is based on conspiracies to pull a number of tactics used in [climate change denial](#) to legitimize political and public controversy disputing this consensus.<sup>[1]</sup> Global warming through worldwide acts of professional and criminal misconduct, the science behind global warming has been invented or distorted for

## Contents [\[hide\]](#)

- Background
- Claims
- Criticism
- Funding
- Fictional representations
- See also
- Notes
- Further reading

## Background [\[edit\]](#)

As stated by the [Intergovernmental Panel on Climate Change \(IPCC\)](#), the largest contributor to global warming is the increase in atmospheric CO<sub>2</sub> particularly from [fossil fuel combustion](#), [cement production](#), and [land use changes](#) such as [deforestation](#).<sup>[4]</sup> The IPCC's [Fifth Assessment Report](#) states that

# *CURATION...*

*A process that proceeds step-by-step  
to generate more reliable and more  
shareable knowledge about the world...*

*Sufficient for shared action*

*(e.g. science)*

*(e.g. traditions, e.g. languages)*

*Edward Sapir,*

*“Culture: Genuine and Spurious”*

*“Sooner or later we shall have to get down to the humble task of exploring the depths of our consciousness and dragging to the light what sincere bits of reflected experience we can find. These bits will not always be beautiful, they will not always be pleasing, but they will be genuine. And then we can build. In time, a genuine culture--better yet, a series of linked autonomous cultures--will grace our lives.”*

# Wiki as Pattern Language<sup>1</sup>

WARD CUNNINGHAM, Cunningham and Cunningham, Sustasis Foundation  
MICHAEL W MEHAFFY, Delft University of Technology, Sustasis Foundation

We describe the origin of wiki technology, which has become widely influential, and its relationship to the development of pattern languages in software. We show how the relationship is deeper than previously understood. The deep shared logic points to unrealized potential, with expanded capability for wikis – including a new generation of “federated” wiki. We draw conclusions about the use of this and related technology to “curate” (collectively gather and refine) knowledge systems.

Categories and Subject Descriptors: **H.5.2 [Information Interfaces and Presentation]:** User Interfaces—*Evaluation/methodology*; **H.1.2 [Models and Principles]:** User/Machine Systems—*Human Information Processing*

General Terms: Human Factors

Additional Key Words and Phrases: Wiki, Pattern Language, Smallest Federated Wiki, Scenario-Modeling

## ACM Reference Format:

Cunningham, W. and Mehaffy, M.W. 2014. “Wiki as Pattern Language.” In *Proceedings of the 20<sup>th</sup> Conference on Pattern Languages of Programs (PLoP'13)*, Monticello, Illinois, USA (October 2013). 15 pages.

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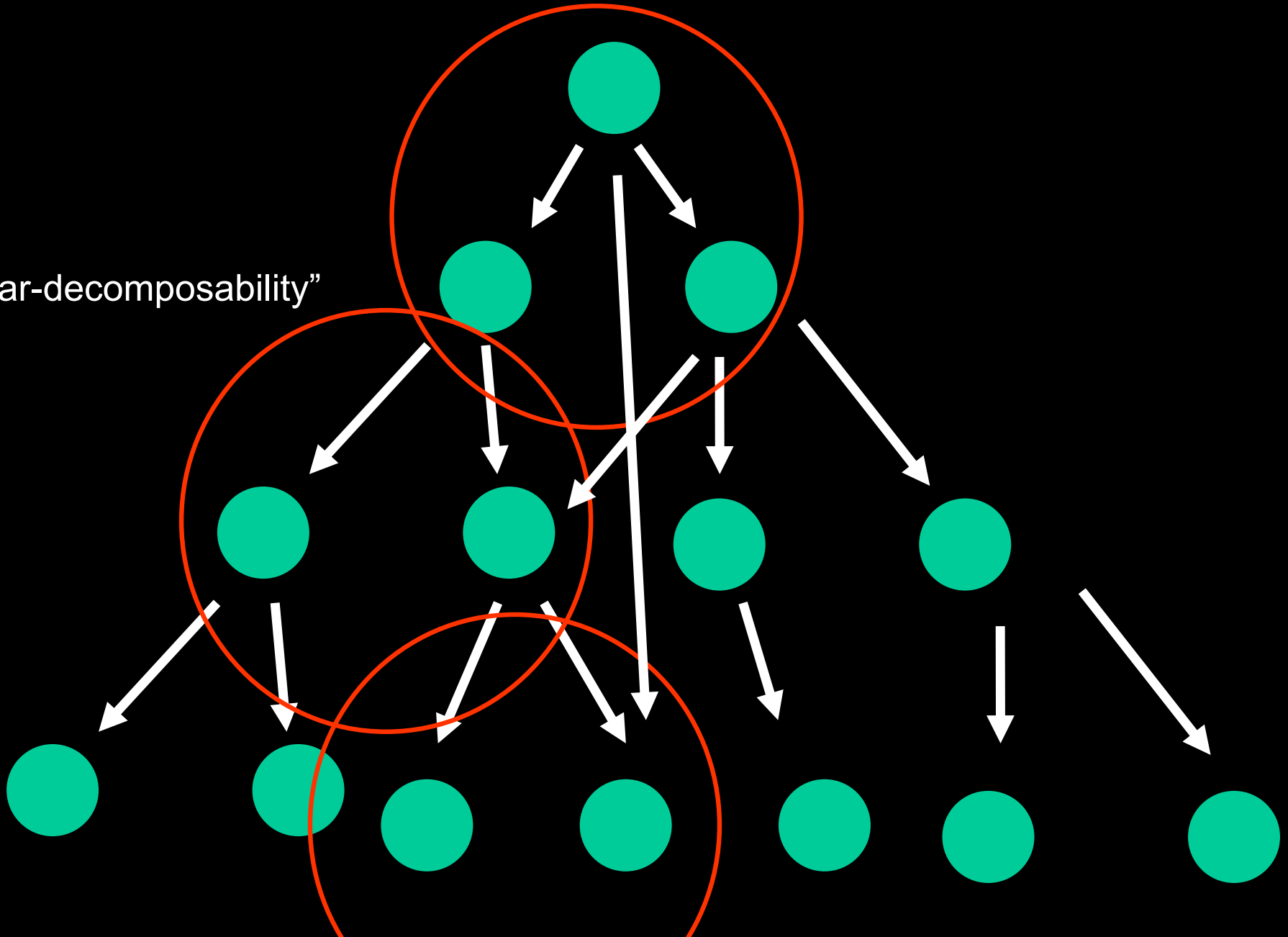
## INTRODUCTION

Wiki is today widely established as a kind of website that allows users to quickly and easily share, modify and improve information collaboratively (Leuf and Cunningham, 2001). It is described on Wikipedia – perhaps its best known example – as “a website which allows its users to add, modify, or delete its content via a web browser usually using a simplified markup language or a rich-text editor” (Wikipedia, 2013). Wiki is so well established, in fact, that a Google search engine result for the term displays approximately 1.25 billion page “hits”, or pages on the World Wide Web that include this term somewhere within their text (Google, 2013a).

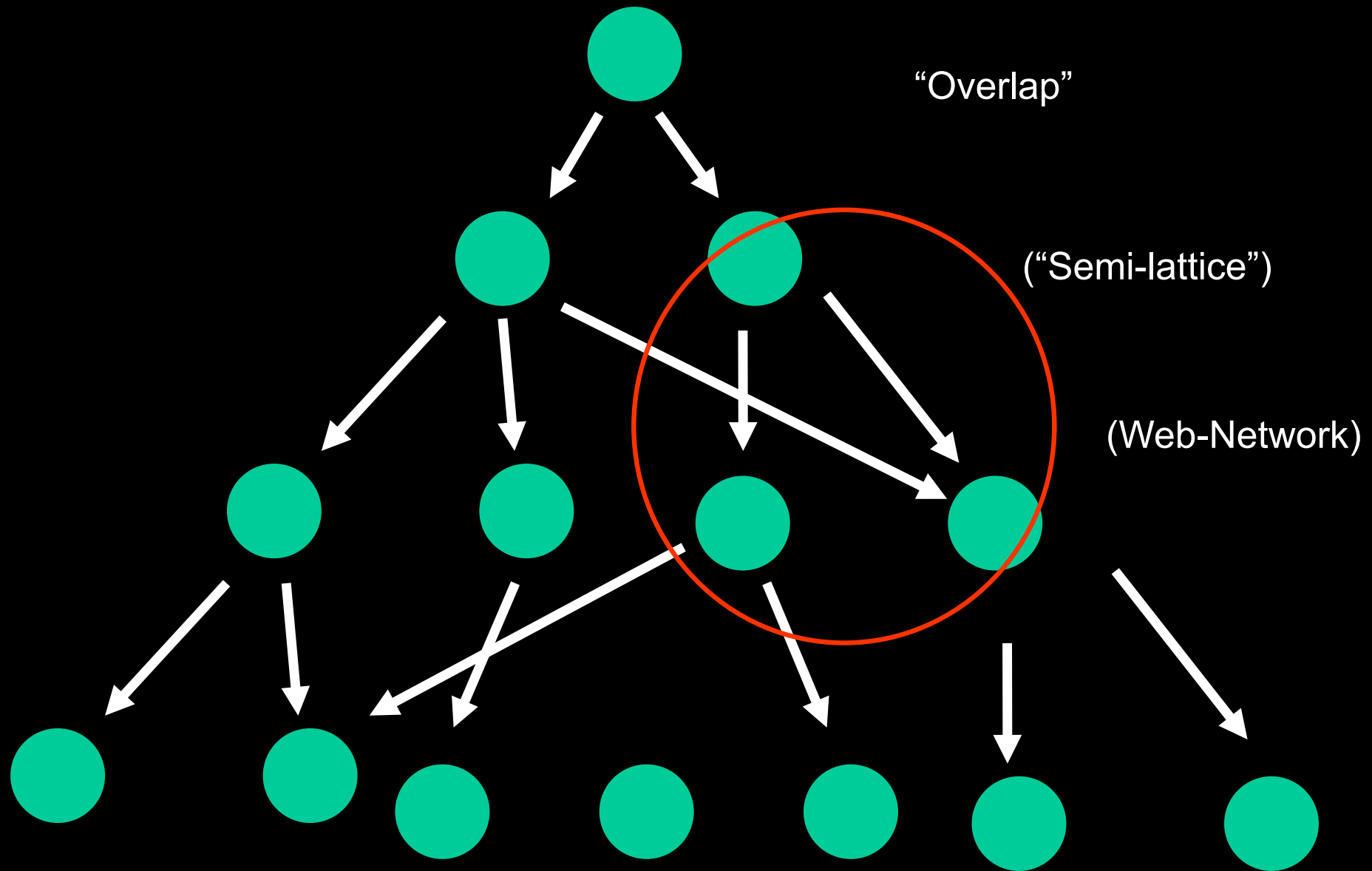
Along with this growth, the definition of what constitutes a “wiki” has broadened since its introduction in 1995. Consider the example of WikiLeaks, where editable content would defeat the purpose of the site. We will exclude

# Herbert Simon, "The Architecture of Complexity" (1962)

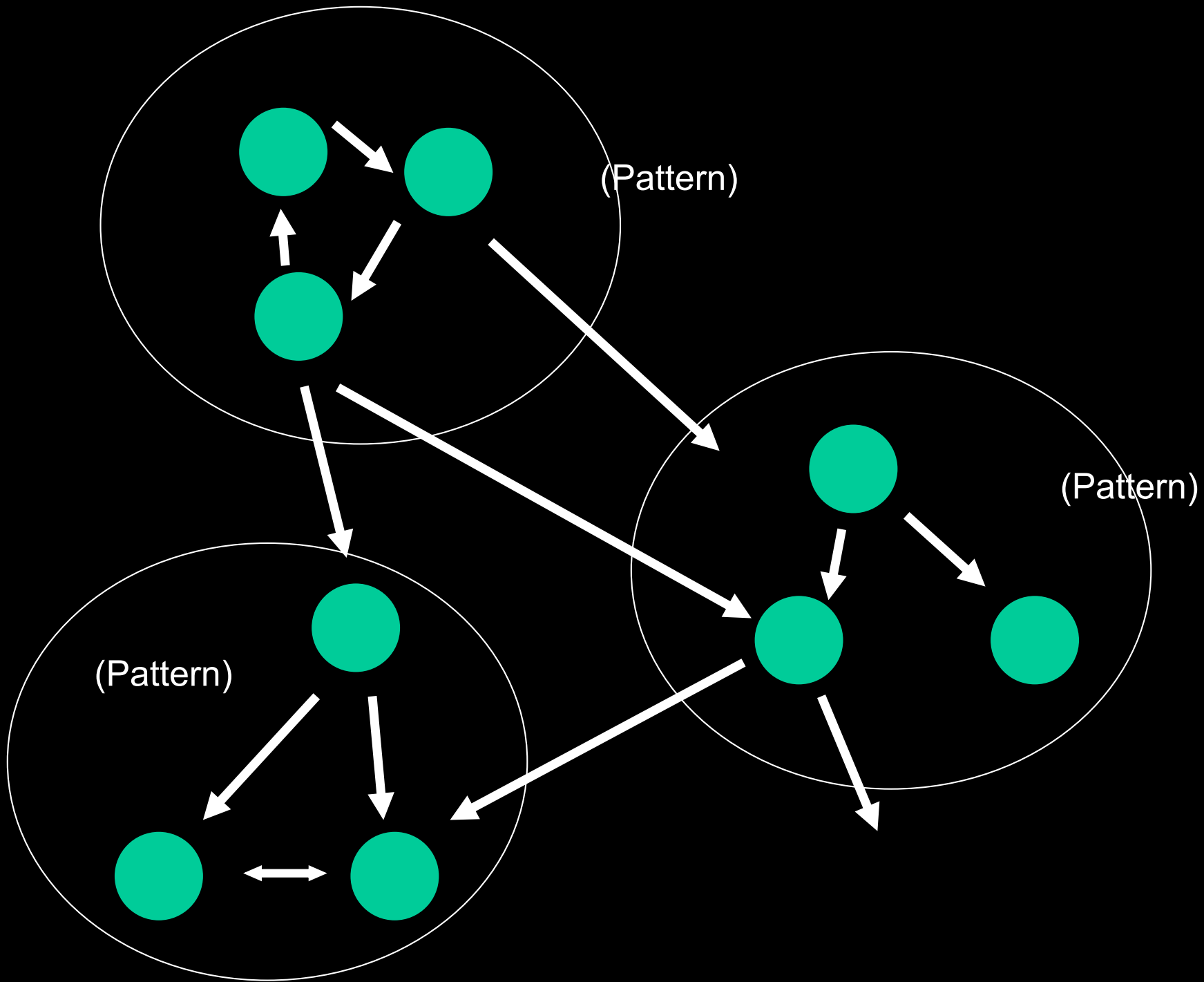
"Near-decomposability"



Christopher Alexander, *Notes on the Synthesis of Form* (1964)







## *Notes on the Synthesis of Form*

NOTES ON THE  
SYNTHESIS  
OF FORM  
CHRISTOPHER ALEXANDER

*What is the relation of the parts of a problem to its whole? (And to its final form?)*

*Do parts make wholes, or do wholes make parts?*

*How does this work in nature?*

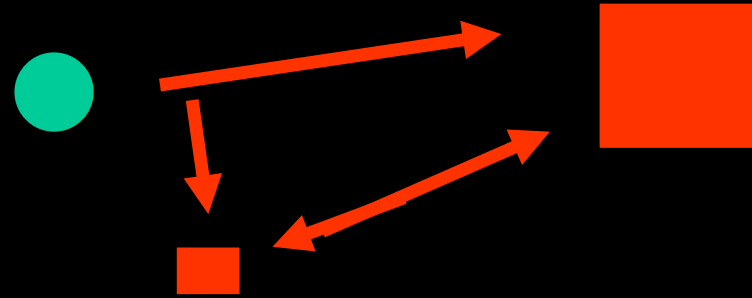
*How does it work in human technology? (Differently??)*

*What new tools and approaches does this suggest?*

## *Mereology:*

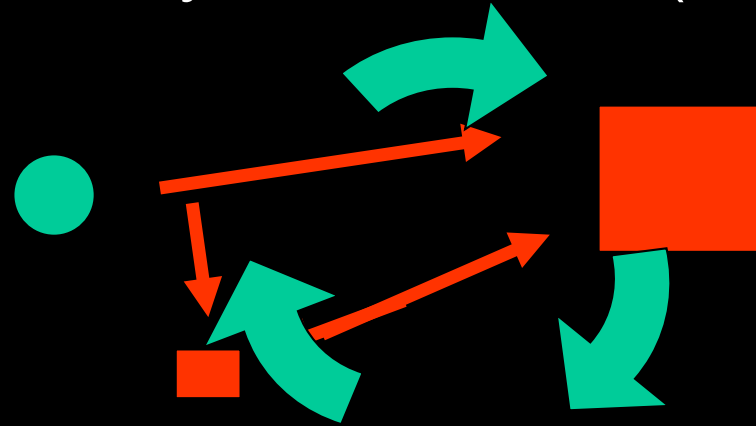
In philosophy, **mereology** (from the Greek μέρος, root: μερε(σ)-, "part" and the suffix -logy "study, discussion, science") is a collection of axiomatic first-order theories dealing with parts and their respective wholes.

# Christopher Alexander, "A City is Not a Tree" (1965)



“...In Berkeley at the corner of Hearst and Euclid, there is a drugstore, and outside the drugstore a traffic light. In the entrance to the drugstore there is a newsrack where the day's papers are displayed. When the light is red, people who are waiting to cross the street stand idly by the light; and since they have nothing to do, they look at the papers displayed on the newsrack which they can see from where they stand. Some of them just read the headlines, others actually buy a paper while they wait.

# Christopher Alexander, "A City is Not a Tree" (1965)



“...This effect makes the newsrack and the traffic light interactive... the traffic light, the electric impulses which make the lights change, and the sidewalk which the people stand on form a system - they all work together.”

**Christopher Alexander**

**A City is Not a Tree:**  
50th Anniversary Edition



with

new commentaries by

Mike Batty • Luis Bettencourt • Howard Davis  
Jaap Dawson • Bin Jiang • Michael W Mehaffy  
Hans Joachim Neis • Sergio Porta • Yodan Rofè  
Mariapia Vidoli • Dellé Odeleye  
and other contributors

edited by

**Michael W Mehaffy**

**Sustasis Press**

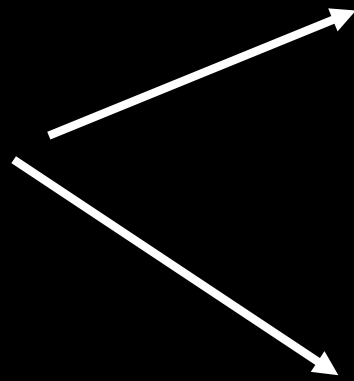
In Association with

**Center for Environmental Structure**

*Strong links – e.g. between the hinges and knob on a door...*

*Weak links – between that door and another door...*

*Hinges*



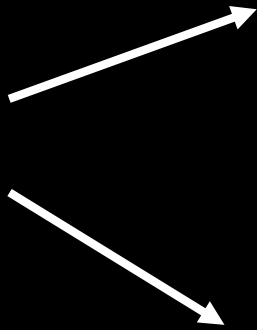
*Knob*



*(The pattern here is “door”...)*

*This door is a good design... its configuration meets the need*

*Hinges*



*Knob*





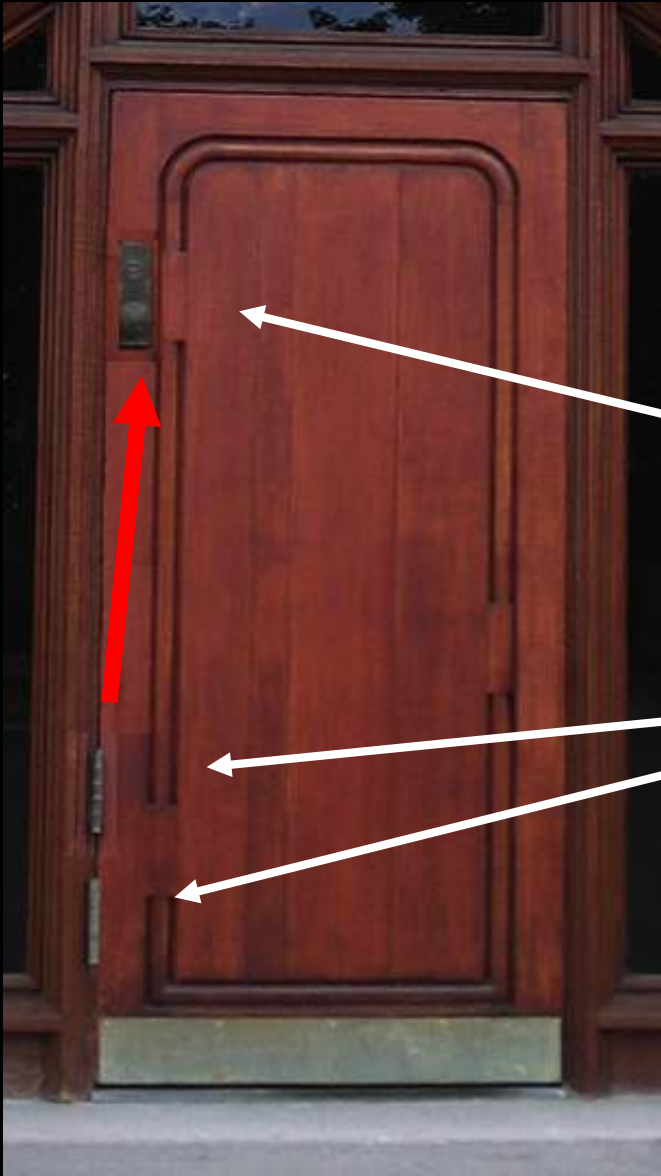
*What about this door?*



*Hinges*

*Knob*

*What about this door?*



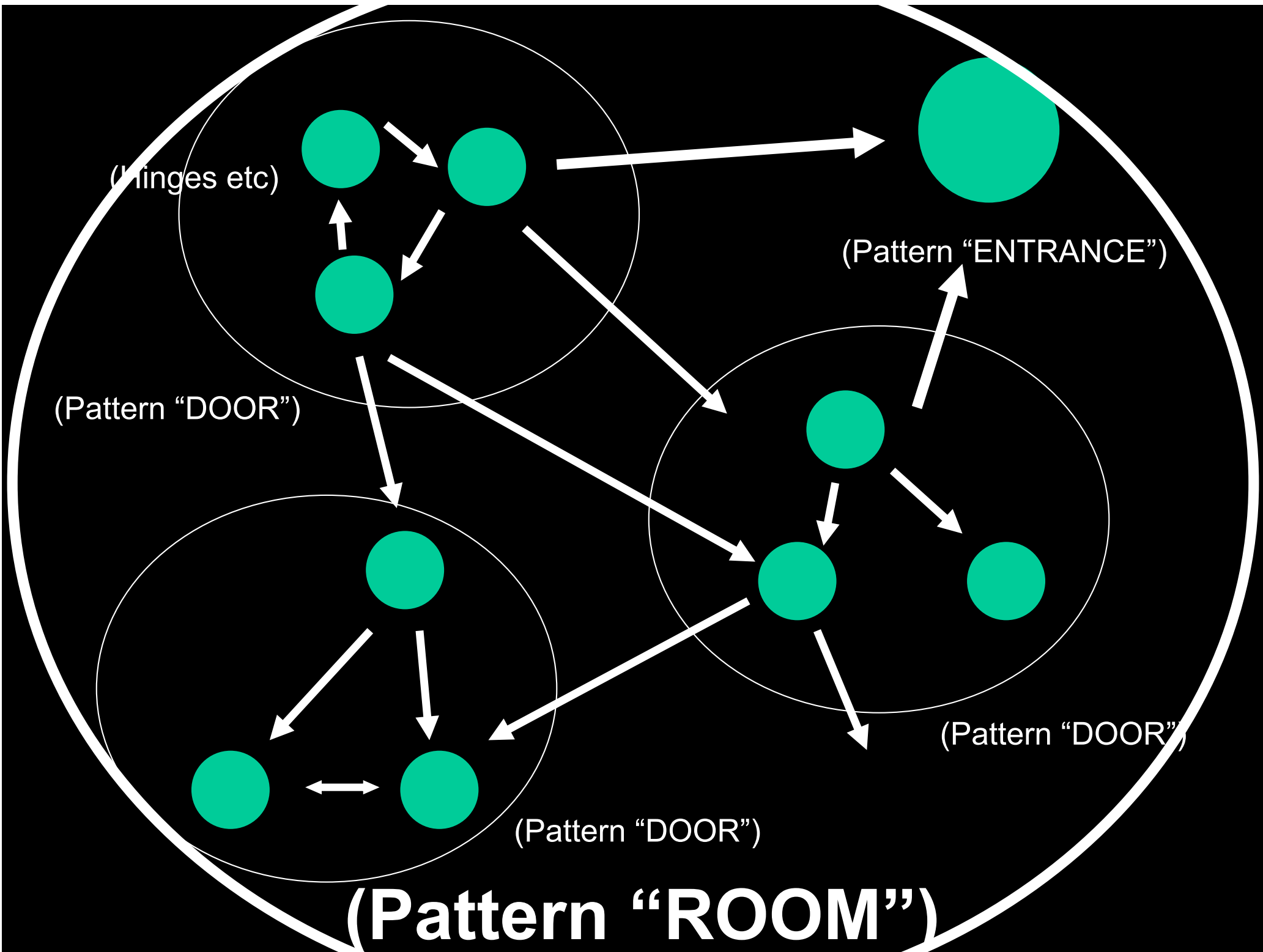
*Knob*

*Hinges*

*Pattern “Door” -*

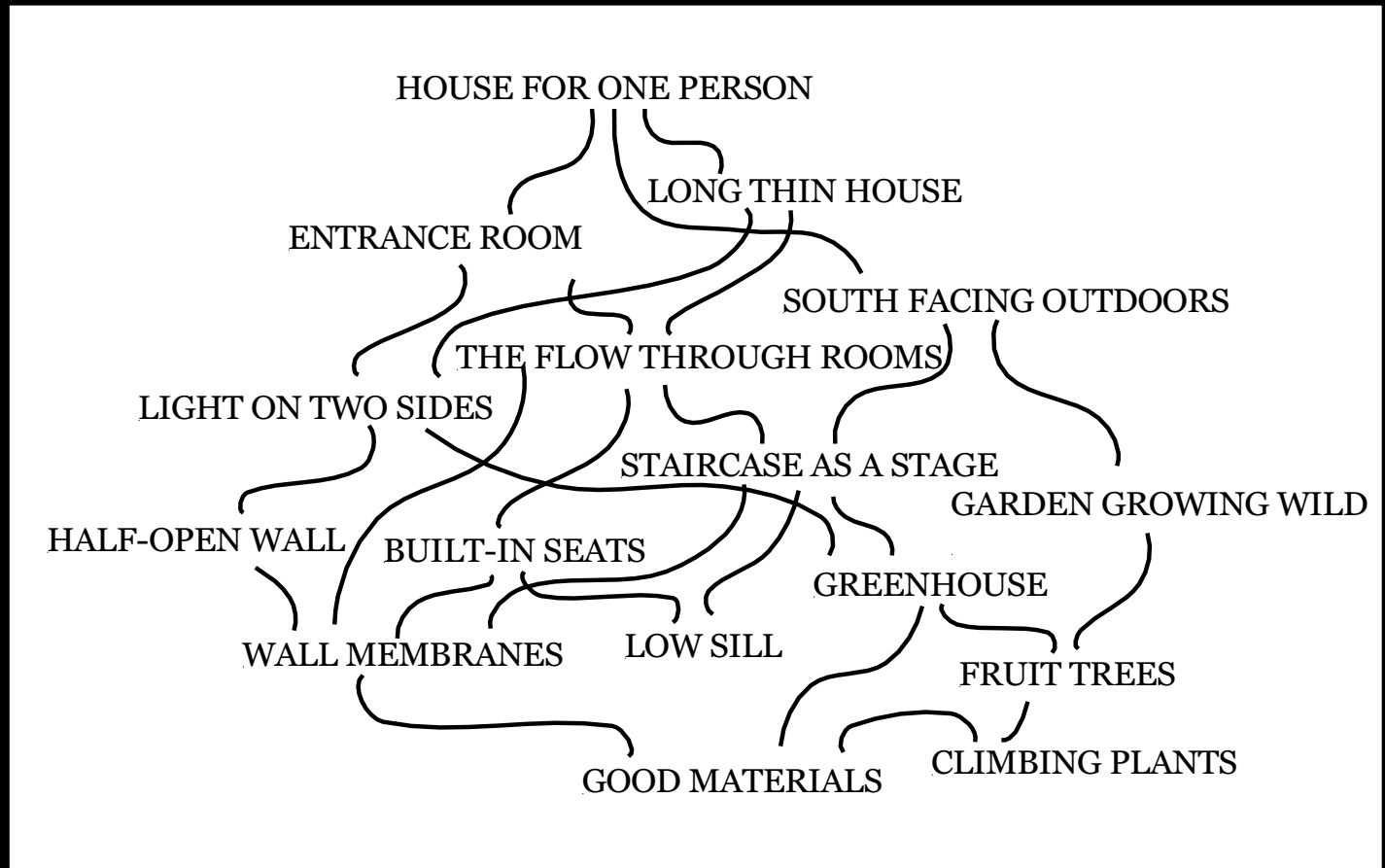
*THEREFORE:*

*Place the hinges on one side of the door,  
near the top and bottom of the door;  
place the handle on the opposite side,  
where it can be reached by most people,  
including those in wheelchairs*



*The patterns fit into  
a network of structured  
options –*

*i.e. a language...*



*What is a “pattern”, really?*

*A pattern is a configuration of things in a place that happen repeatedly in a similar way.*

## *What is a Pattern Language?*

*You combine your patterns in particular ways, following simple rules like the rules of grammar. The patterns with their rules for combining together are called a pattern language. The pattern language allows you to make complete wholes, rather than just assembled collections of bits – more like poetry than a simple list or hierarchy of information.*

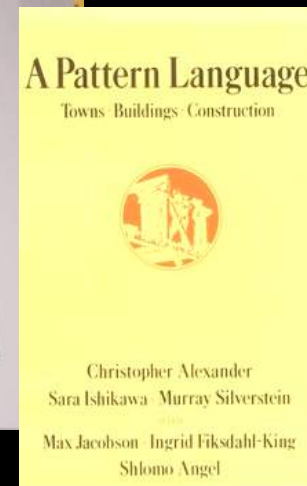
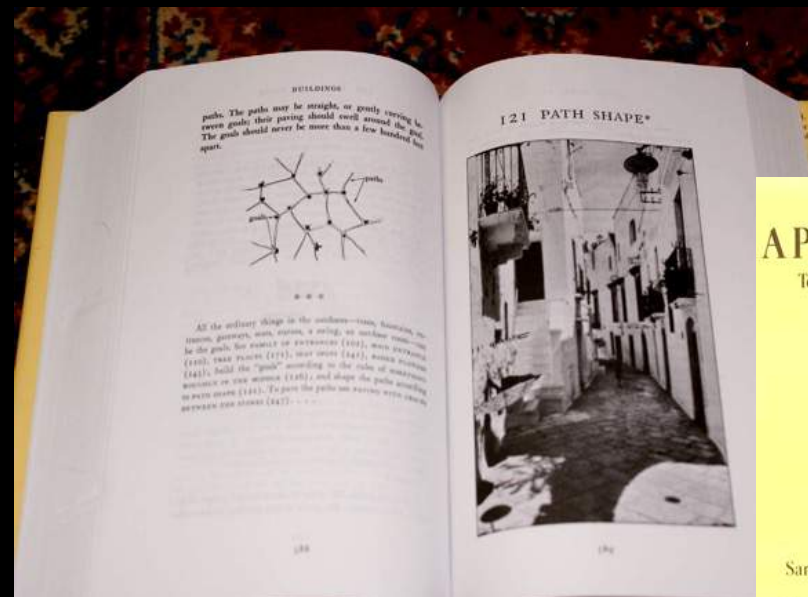
# *What is a Pattern Language?*

*(Continued)*

*You can begin to see that a pattern is made up of other patterns, just as forests are made of trees, and trees are made of leaves. But leaves don't always "make" trees. In fact, it's more accurate to say that trees make leaves! Often patterns "differentiate" into other patterns, as part of their "mereology" (the relation of parts to wholes).*



*Pattern languages respond to the idea that it's possible to have good designs... and bad ones (i.e. an “evidence-based approach”)*

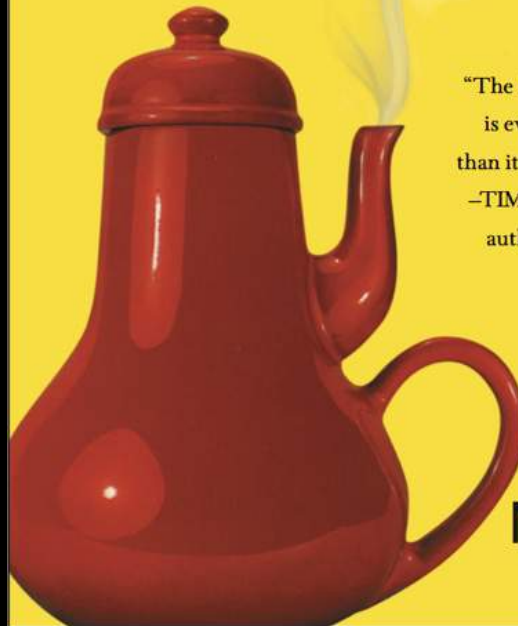


*And to manage them within web-networks...*

*This teapot is clearly not a good design!*

REVISED & EXPANDED EDITION

*The* DESIGN  
*of* EVERYDAY  
THINGS



*“The Design of Everyday Things  
is even more relevant today  
than it was when first published.”*  
—TIM BROWN, CEO of IDEO,  
author of *Change by Design*

DON  
NORMAN

*An Alexandrian Pattern includes 1) a title and 2) iconic image.....*

# A Pattern Language

Towns Buildings Construction



Christopher Alexander

Sara Ishikawa - Murray Silverstein

Max Jacobson - Ingrid Eiksdahl-King  
Shlomo Angel

## BUILDINGS



Keep the arcade low—CEILING HEIGHT VARIETY (199); lower the roof of the arcade as low as possible—SHELTERING ROOF (117); make the columns thick enough to lean against—COLUMN PLACE (226); and make the openings between columns—COLUMN and low—LOW DOORWAY (224), COLUMN CONNECTION (227)—either by arching them or by making deep beams or with lattice work—so that the inside feels enclosed—BUILDING EDGE (160); HALF-OPEN WALLS (193). For construction see STRUCTURE FOLLOWY SOCIAL SPACES (205) and THICKENING THE OUTER WALLS (211). . . .

## 120 PATHS AND GOALS\*



### 3) Upward hyperlinks...4) problem statement...5) analysis...

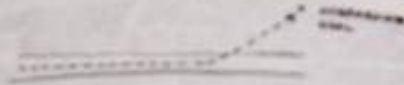
... once buildings and arcades and open spaces have been roughly fixed by BUILDING COMPLEX (95), WINGS OF LIGHT (107), POSITIVE OUTDOOR SPACE (106), ARCADES (119)—it is time to pay attention to the paths which run between the buildings. This pattern shapes these paths and also helps to give more detailed form to DEGREES OF PUBLICNESS (16), NETWORK OF PATHS AND CARS (52), and CIRCULATION REALMS (98).



The layout of paths will seem right and comfortable only when it is compatible with the process of walking. And the process of walking is far more subtle than one might imagine.

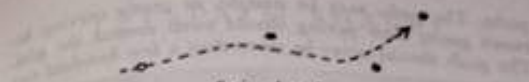
Essentially there are three complementary processes:

1. As you walk along you scan the landscape for intermediate destinations—the farthest points along the path which you can see. You try, more or less, to walk in a straight line toward those points. This naturally has the effect that you will cut corners and take “diagonal” paths, since these are the ones which allow for straight lines between your present position and the point which you are making for.



Fast to a goal.

2. These intermediate destinations keep changing. The farther you walk, the more you can see around the corner. If you always walk straight toward the farthest point and the farthest point keeps changing, you will actually move in a slow curve, like a missile tracking a moving target.



Series of goals.

3. Since you do not want to keep changing direction while you walk and do not want to spend your whole time re-calculating your best direction of travel, you arrange your walking process in such a way that you pick a temporary “goal”—some clearly visible landmark—which is more or less in the direction you want to take and then walk in a straight line toward it for a hundred yards, then, as you get close, pick another new goal, once more a hundred yards farther on, and walk toward it. . . . You do this so that in between, you can talk, think, daydream, smell the spring, without having to think about your walking direction every minute.



The actual path.

In the diagram above a person begins at A and heads for point E. Along the way, his intermediate goals are points B, C, and D. Since he is trying to walk in a roughly straight line toward E, his intermediate goal changes from B to C, as soon as C is visible; and from C to D, as soon as D is visible.

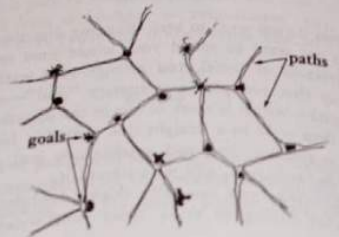
The proper arrangement of paths is one with enough intermediate goals, to make this process workable. If there aren't enough intermediate goals, the process of walking becomes more difficult, and consumes unnecessary emotional energy.

Therefore:

To lay out paths, first place goals at natural points of interest. Then connect the goals to one another to form the

6) diagrammatic conclusion...and 7) downward hyperlinks

paths. The paths may be straight, or gently curving between goals; their paving should swell around the goal. The goals should never be more than a few hundred feet apart.

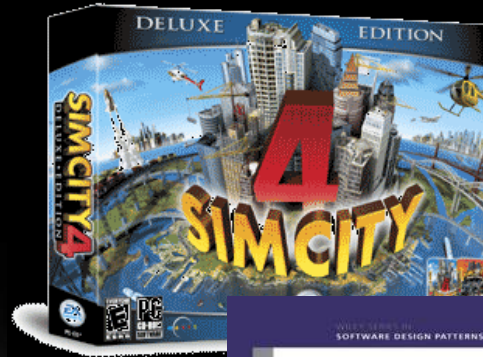


All the ordinary things in the outdoors—trees, fountains, entrances, gateways, seats, statues, a swing, an outdoor room—can be the goals. See FAMILY OF ENTRANCES (102), MAIN ENTRANCE (110), TREE PLACES (171), SEAT SPOTS (241), RAISED FLOWERS (245); build the "goals" according to the rules of SOMETHING ROUGHLY IN THE MIDDLE (126); and shape the paths according to PATH SHAPE (121). To pave the paths use PAVING WITH CRACKS BETWEEN THE STONES (247).

121 PATH SHAPE\*



# Pattern languages are ubiquitous in design in many fields today...



*The Addison-Wesley Signature Series*

**PATTERNS OF  
ENTERPRISE  
APPLICATION  
ARCHITECTURE**



**MARTIN FOWLER**  
WITH CONTRIBUTIONS BY  
DAVID REIC,  
MATTHEW FOEMMEL,  
EDWARD HIRATT,  
ROBERT MEL, AND  
RANDY STAFFORD



**PATTERN-ORIENTED  
SOFTWARE  
ARCHITECTURE**  
A System of Patterns

**Volume 1**

Frank Buchmann  
Regine Meunier  
Hans Rohrer  
Peter Sommerlad  
Michael Stal



*Applying A Pattern Language*

to Online Community Design

And have spawned some other perhaps surprising innovations...

WIKIPEDIA

**English**  
*The Free Encyclopedia*  
500 000+ articles

**Deutsch**  
*Die freie Enzyklopädie*  
210 000+ Artikel

**日本語**  
フリー百科事典  
105 000+ 記事

**Svenska**  
*Den fria encyklopedin*  
66 000+ artiklar

**Nederlands**  
*De vrije encyclopedie*  
60 000+ artikelen

**Italiano**  
*L'enciclopedia libera*  
37 000+ articoli

**Français**  
*L'encyclopédie libre*  
90 000+ articles

**Polski**  
*Wolna Encyklopedia*  
60 000+ haseł

**Español**  
*La enciclopedia libre*

a multilingual free encyclopedia  
**Wiktionary**  
[ˈwɪkʃənri] n.,  
a wiki-based Open Content dictionary

VIKIMEDIA  
META-WIKI

**Real Estate Wiki**  
A Real Estate Guide for You, by You

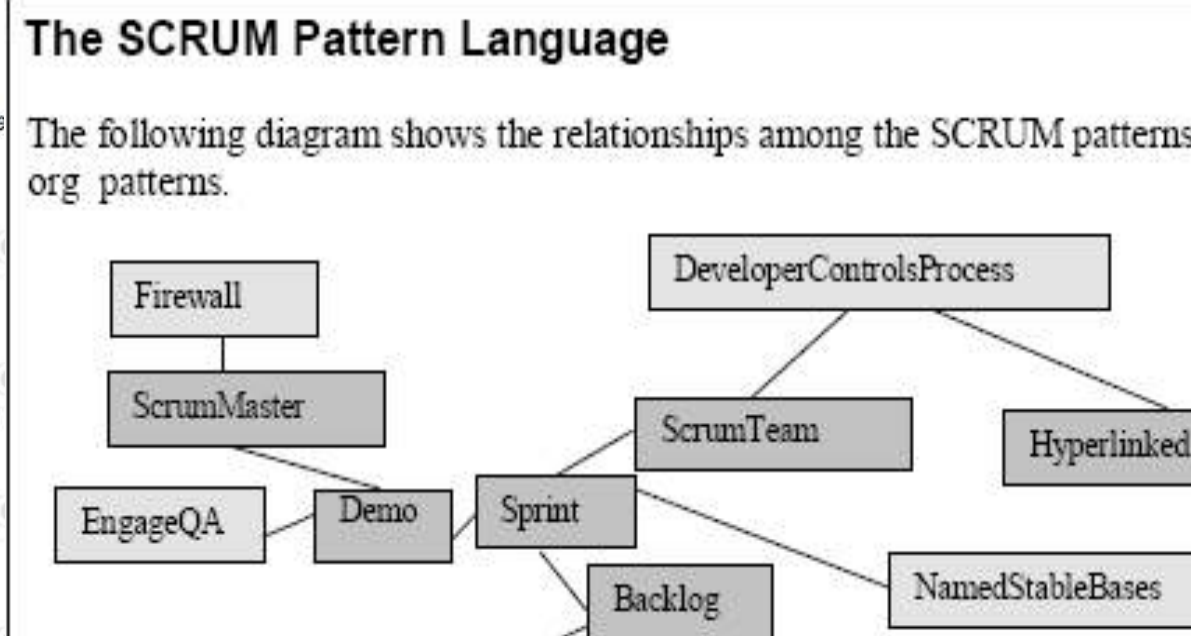
Welcome to the Real Estate Wiki

- Learn the ins and outs of buying and selling in the wiki
- Contribute and share your knowledge with others
- Visit our Guidelines and Good Neighbor Policy for help using the wiki

**Buying Wiki**      **Selling Wiki**

**Where to Start**

- Finding Home Listings
- Can You Afford to Buy
- Best Times to Buy
- Owning vs. Renting a Home
- Coming Up With a Down Payment
- Mortgage Pre-Approval
- First-time Home Buyers vs. Old Hands
- Credit Reports Explained
- The Home Remodeling Decision
- Home Buyers' Regrets
- Basic Mortgage Questions
- Qualifying for a Mortgage
- Understanding Mortgage Types
- Choosing a Lender
- Types of Lenders
- Home Equity Loans and

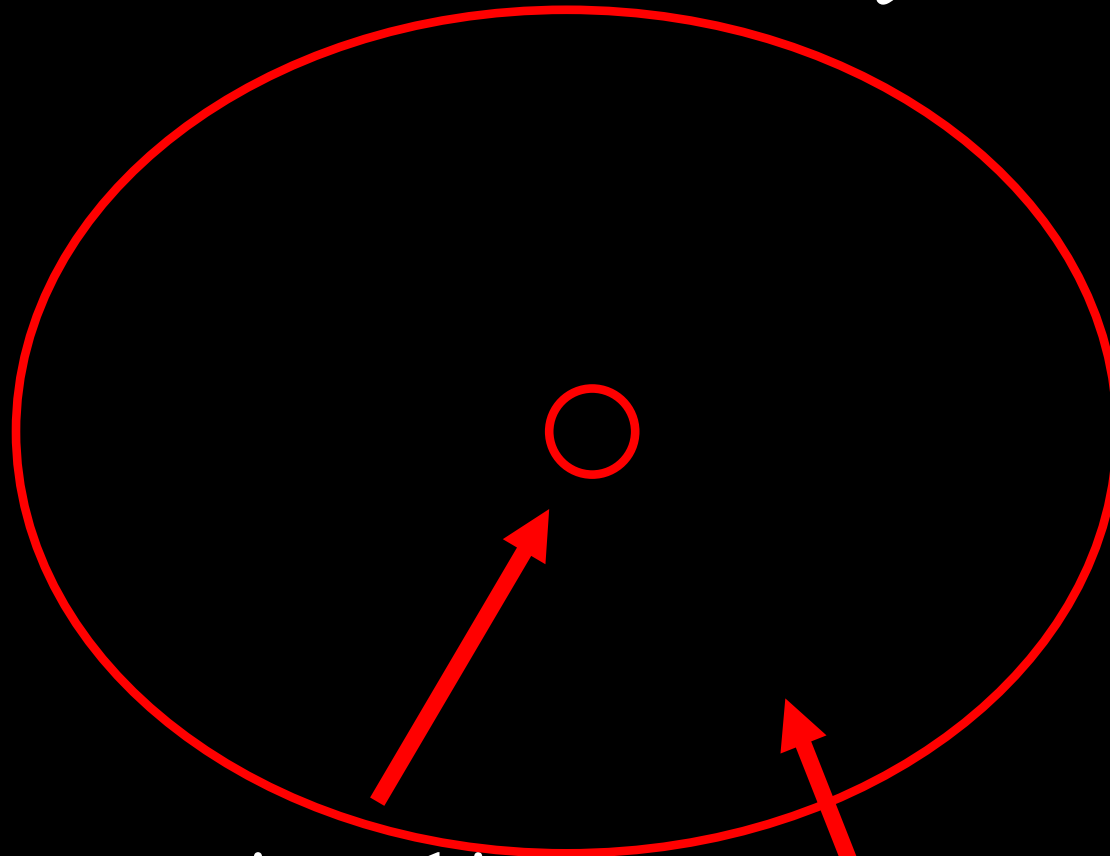


*Another conundrum:*

*Why have pattern languages not been more influential in the world of the built environment?*



*PL influence as indicated by Google hits:*



Pattern languages in architecture

260,000 hits

Pattern languages in software  
(AKA “design patterns”)

29,400,000 hits!

*Other pattern language work (not including computer science):*

PALM - A pattern language for molecular biology Carsten Helgesen and Peter R. Sibbald J t Department of Informatics, University of Bergen

The Pattern Language for Participation, Action, and Change

A Pattern Language for Strategic Product Management

Towards a Pattern Language for Person-Centered e-Learning  
M Derntl, R Motschnig-Pitrik - TECHNOLOGY AND  
TEACHER EDUCATION

Calculating the secrets of life: applications of the mathematical  
sciences in molecular biology ... Eric S. Lander, Michael S.  
Waterman....

“We have constructed PLANS, A Pattern Language for Amino  
and Nucleic Acid Sequences, and implemented this language in  
LISP and C...”

Developing a pattern language for innovation management  
Research (Le Pechoux, 2000)

Machine models of music - Stephan M. Schwanauer,  
David A. Levitt - 1993 - 544 "Pattern in Music" presents a  
formal pattern language for music.

A Pattern Language for a Conservation Economy (Stuart Cowan)

KEWS: A pattern language for environmental research

“A pattern approach to interaction design” - Jan Borchers - 2001 –  
246 Chapter 4 A Pattern Language for Interactive Music  
Exhibits

Weiss [14] describes a pattern language for agent-based e-commerce.

a pattern language for weddings

a pattern language for educational systems

A pattern language for pattern writing (!)

The pattern language for the graphical user interface

Cross JK and Schmidt, D., "Quality Connector: A Pattern Language for Provisioning and Managing Quality-Constrained Services in Distributed Real-Time and Embedded Systems," 9th Conference on Pattern Language and Programs, Monticello IL, Sep 2002

A pattern language for sustainability

A pattern language for living communication

**Dynamical patterning modules: a "pattern language" for development and evolution of multicellular form**

Stuart A. Newman\* and Ramray Bhat

*Department of Cell Biology and Anatomy, Basic Science Building, New York Medical College, New York, USA*

We propose that DPMs, acting singly and in combination with each other, constitute a "pattern language" capable of generating all metazoan body plans and organ forms. This concept implies that the multicellular organisms of the late Precambrian-early Cambrian were phenotypically plastic, fluently exploring morphospace in a fashion decoupled from both function-based selection and genotypic change. The relatively stable developmental trajectories and morphological phenotypes of modern organisms, then, are considered to be products of stabilizing selection.



## **UNDERSTANDING COMPLEXITY THROUGH PATTERN LANGUAGES IN BIOLOGICAL AND MAN-MADE ARCHITECTURES**

### **Comparisons between Biological and Architectonic Patterns**

**Ramray Bhat**

*Life Sciences Division,  
Lawrence Berkeley National Laboratory  
[RBhat@lbl.gov](mailto:RBhat@lbl.gov)*

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#### **Abstract**

*In 1944, the celebrated physicist, Erwin Schrodinger, famously asked, "What is Life?" Neither Schrodinger nor generations of illustrious scientists after him have been able to satisfactorily answer this question. What is generally agreed upon, however, is that being alive is about being complex: forming, transforming, and maintaining a structural organization that consists of multiple constituents arranged in specific orders and patterns. The advances in the theory of complexity have come not just from biologists, but also from architects and urban theorists. In this essay, I discuss how theorists from both life and architectonic sciences have come to a similar conclusion: that patterned and organized form ensures proper function and, ultimately, life. I show how deviation from this principle in biology leads to cancer and death; in architecture, the deviation allows the takeover of mechanical and imagery-based building ideologies leading to dysfunctional and 'lifeless' building and public spaces.*

## **THE LOSS OF BIOLOGICAL ORGANIZATION LEADS TO CANCER**

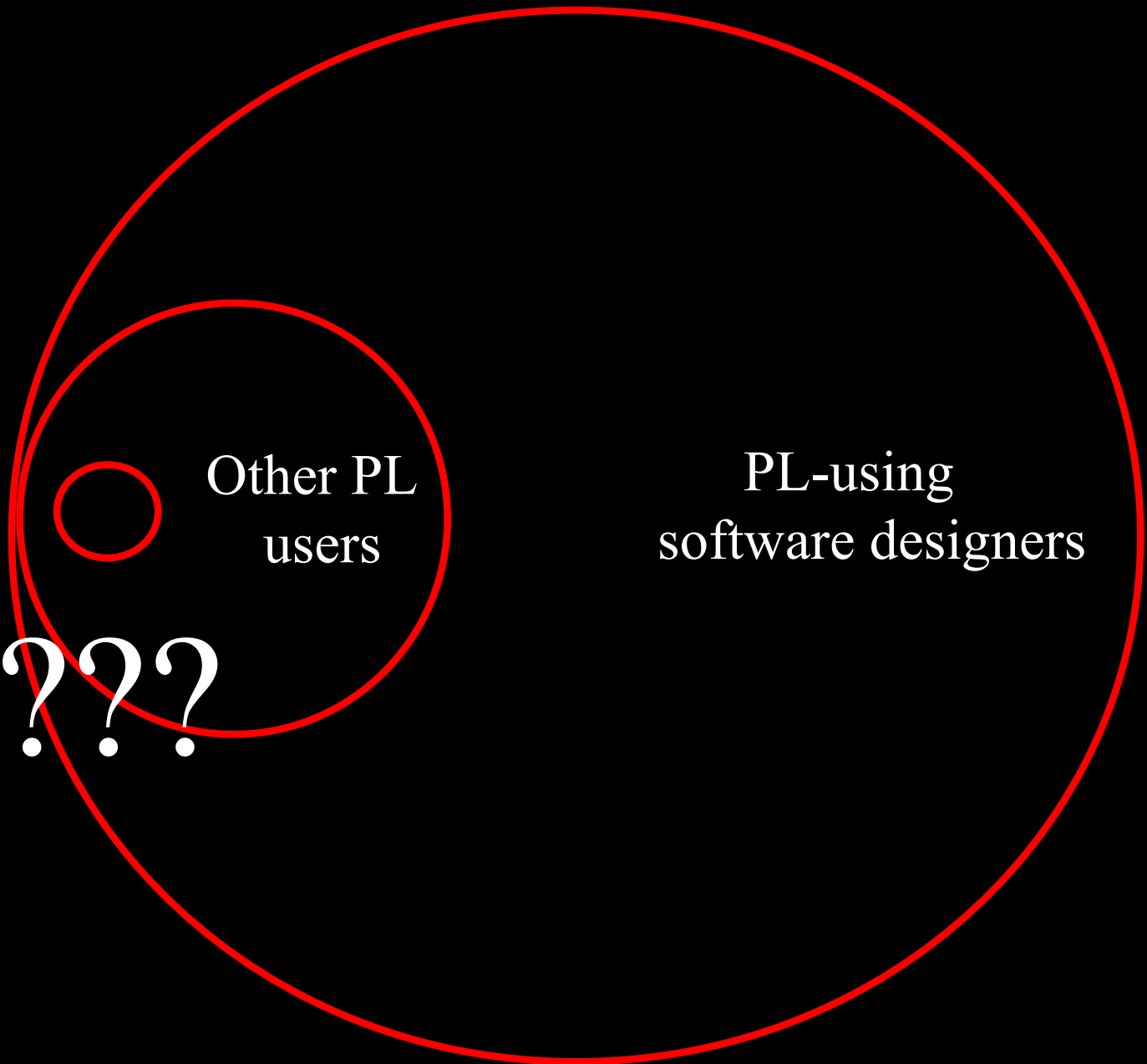
We are thus naturally motivated to ask what happens when the organ architecture is disturbed due to some reason. The answer - cancer - would likely even surprise many biologists. Cancer is a deadly disease that afflicts and kills millions of people all over the world. The cause of cancer is often opined to be mutations of specific genes, elements that code for the proteins, the building blocks of biological form. This is biological reductionism at its most extreme. Abnormalities of the organ's microenvironment result in incorrect signals to the genes, including those that are responsible for tissue structure, ECM production, and even cellular health (Lochter and Bissell, 1995; Sonnenschein and Soto, 2008). The convergence of all these pathological signals is cancer. It is important to note that the gene mutations purported to bring about cancer are present in every single cell of the body and yet the individual is afflicted with only cancer of a particular organ. Cancer is therefore a disease of the organ architecture and not the genes.

Despite the fact that every organ is different and its cancerous state is also therefore unique, there are some properties common to the various types of cancers. The first is, of course, a breakdown in organization of the organ: boundaries between erstwhile well-separated cells are no longer honored. A characteristic 'superstructure-scaffold' that acts as the microenvironment for a large subset of cells (known as epithelia) is the basement membrane. Cancer results in breakdown of this superstructure and results in contact between cells that were not supposed to communicate with each other. The result is abnormal communications and signaling leading to loss of organ function (Bhat & Bissell, 2014).

## CONCLUSION

In this essay, I have put across sets of principles that were not considered 'mainstream' in biology and architecture, but are increasingly gaining ground in the respective disciplines. I show that these principles may have different names, but bear a great deal of geometric similarity to each other. Examined closely, these sets of principles are crucial in their ability to give rise to spatial complexity in both biological and man-made architectures. Additionally, they are required for homeostasis (biology) and sustainability (architecture). Their loss leads to cancer in organs. An absence of these principles in architectonic methodologies, especially of the current era, underlies the reasons why some buildings, neighborhoods, and even cities start decaying and dying.

Architects



Other PL  
users

PL-using  
software designers

???

*Theory 1:*

*“Architects are weird.”*

## *Theory 2:*

*“PL is defective, and won’t work in the built environment”*

*(“But is somehow still useful in these other areas??”)*

## *Theory 3:*

*Something very interesting is going on in technology, and in culture...*

*(Which may suggest new opportunities for Pattern Languages?)*

*Collaborative and management models...*

*Open-source systems...*

*Changes in organization theory...*

*Manufacturing, one-off, customization...*

*A new understanding of nature  
(Complexity, algorithms, emergence etc)*

*A new understanding of biological systems  
and the logic of their processes*



The Death and Life of Great American Cities:  
*The Kind of Problem a City Is*

Jane Jacobs, 1961

“Among the many revolutionary changes of this century, perhaps those that go deepest are the changes in the mental methods we can use for probing the world....”

The Death and Life of Great American Cities:  
*The Kind of Problem a City Is*

Jane Jacobs, 1961

“Problems of organized complexity...”

*(After the successes of mechanical and statistical models, but also their limits and unanticipated consequences...)*

Jane Jacobs, 2001

“A ‘web way of thinking’ ...”

As opposed to

“A ‘thing’ theory”

The Death and Life of Great American Cities:  
*The Kind of Problem a City Is*

Jane Jacobs, 1961

Learning to manage “problems of  
organized complexity...”

*(After the successes of mechanical and statistical models, but  
also their limits and unanticipated consequences...)*

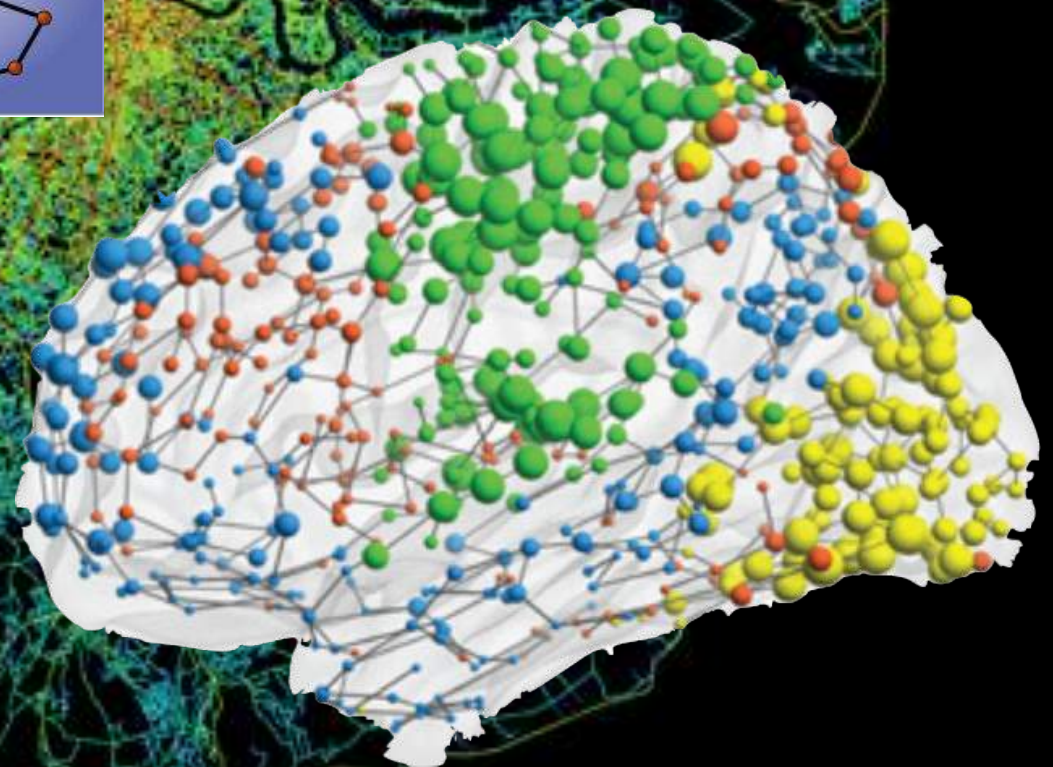
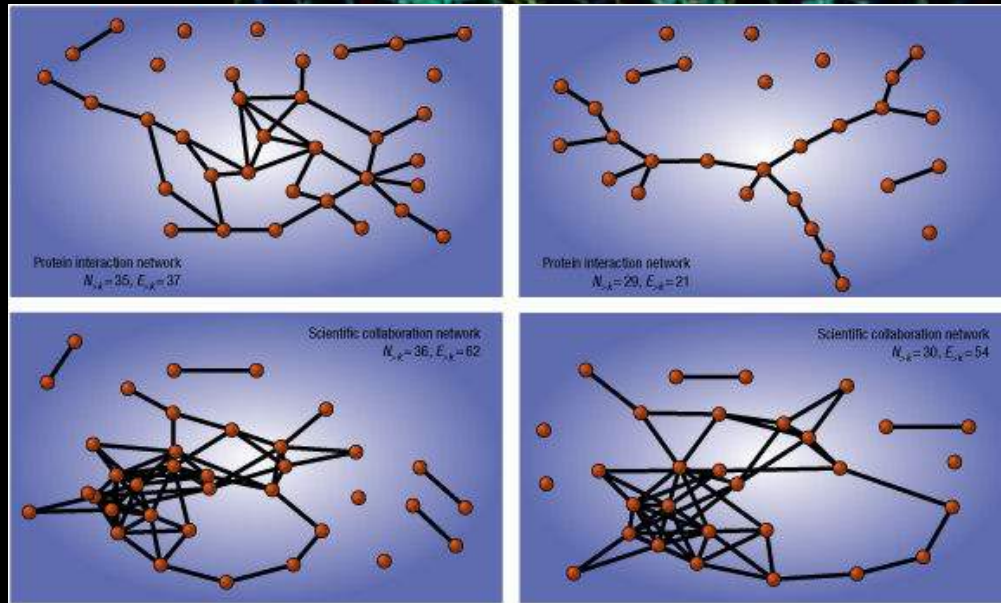
The book cover features a black and white photograph of Jane Jacobs and Christopher Alexander in conversation on a city street. Jane Jacobs is on the left, wearing glasses and a dark top with a necklace. Christopher Alexander is on the right, also wearing glasses and a light-colored shirt, smiling. The background shows a busy street with people walking and buildings. A white rectangular box is centered over the image, containing the title and subtitle. A teal bar at the bottom contains the author's name.

# CITIES ALIVE


*Jane Jacobs,  
Christopher Alexander,  
and the Roots of the  
New Urban Renaissance*

MICHAEL W. MEHAFFY

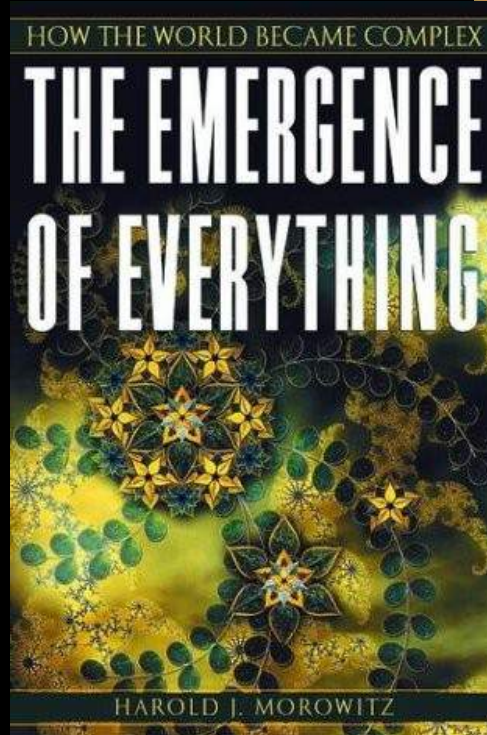
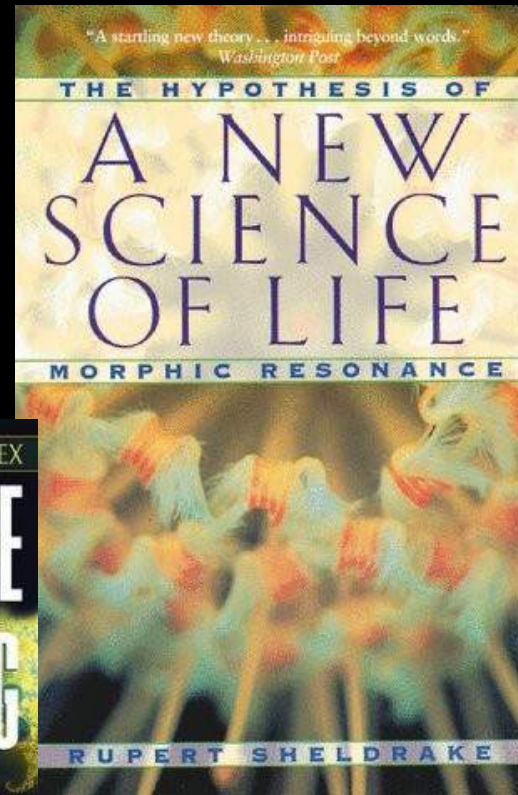
# *Rapid developments in network science...*



# *Rapid developments in so-called complexity science*



**STEPHEN  
WOLFRAM**  
A NEW  
KIND OF  
SCIENCE



# Emergent Patterns and Cellular Automata

A one-dimensional model of a cellular automata system with two states, yellow and green, where the neighborhood includes one cell on either side of the cell in focus. That cell is marked with a red dot in the state diagram, showing how it changes based on the state of it and its neighbors in the previous cycle.

Starting state:



New focus cell state:



Starting state:



New focus cell state:



State 1:



State 2:



State 3:



State 4:



State 5:



State 6:

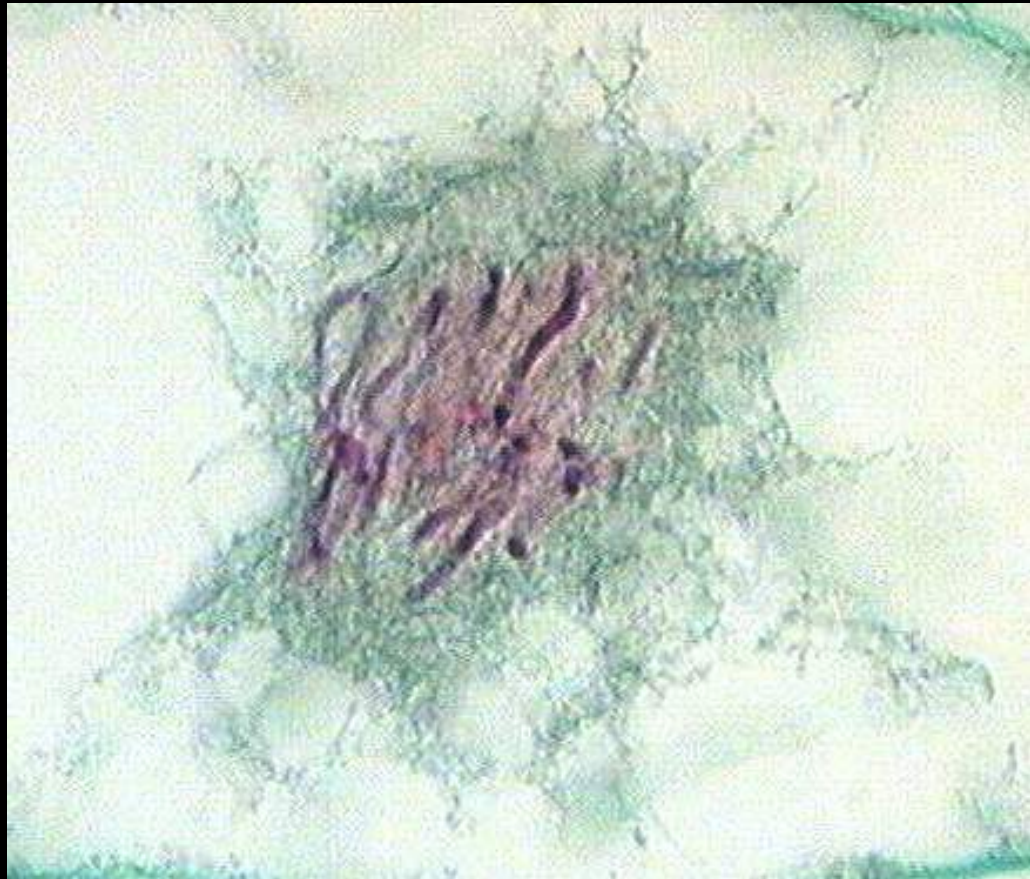


State 7:





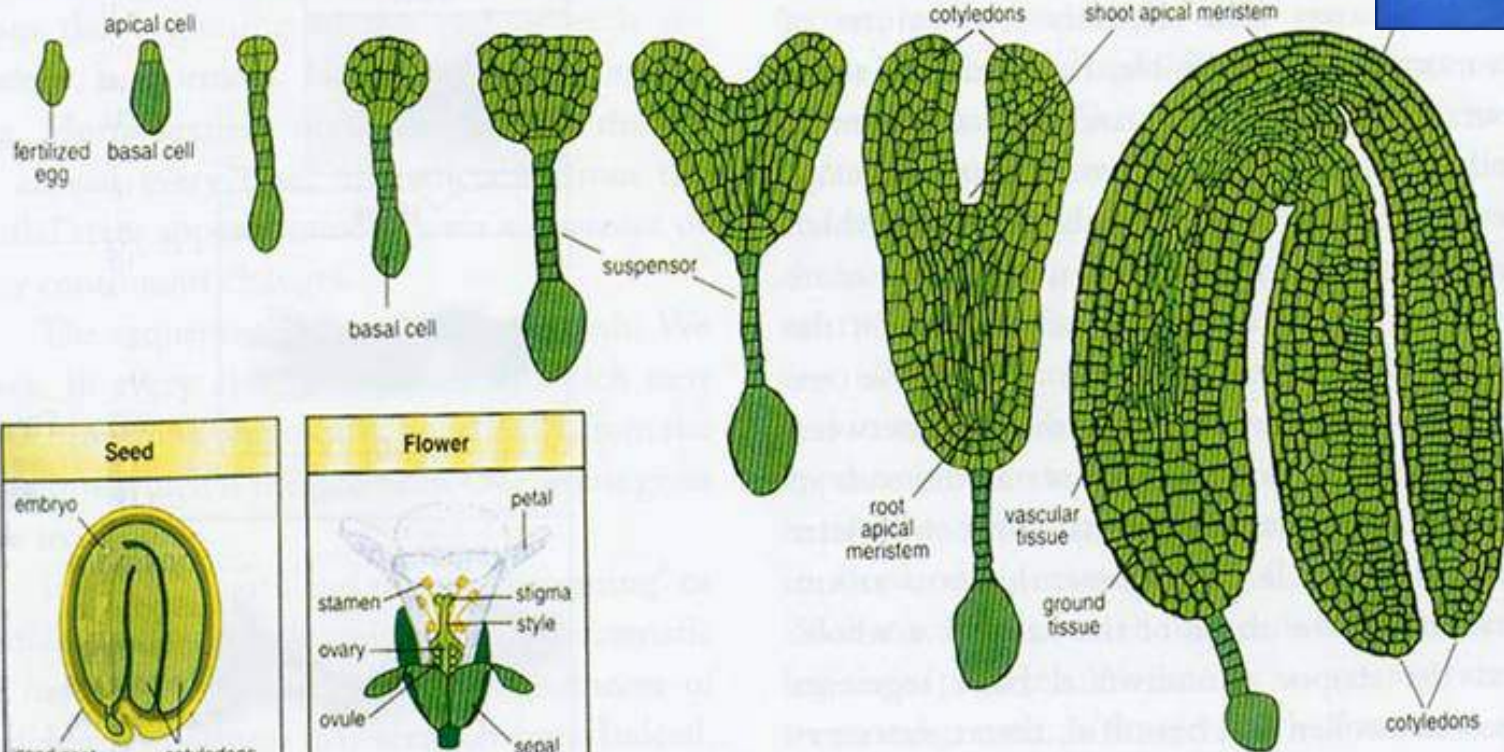
# *The Genome and the Proteome...*



# Morphogenesis

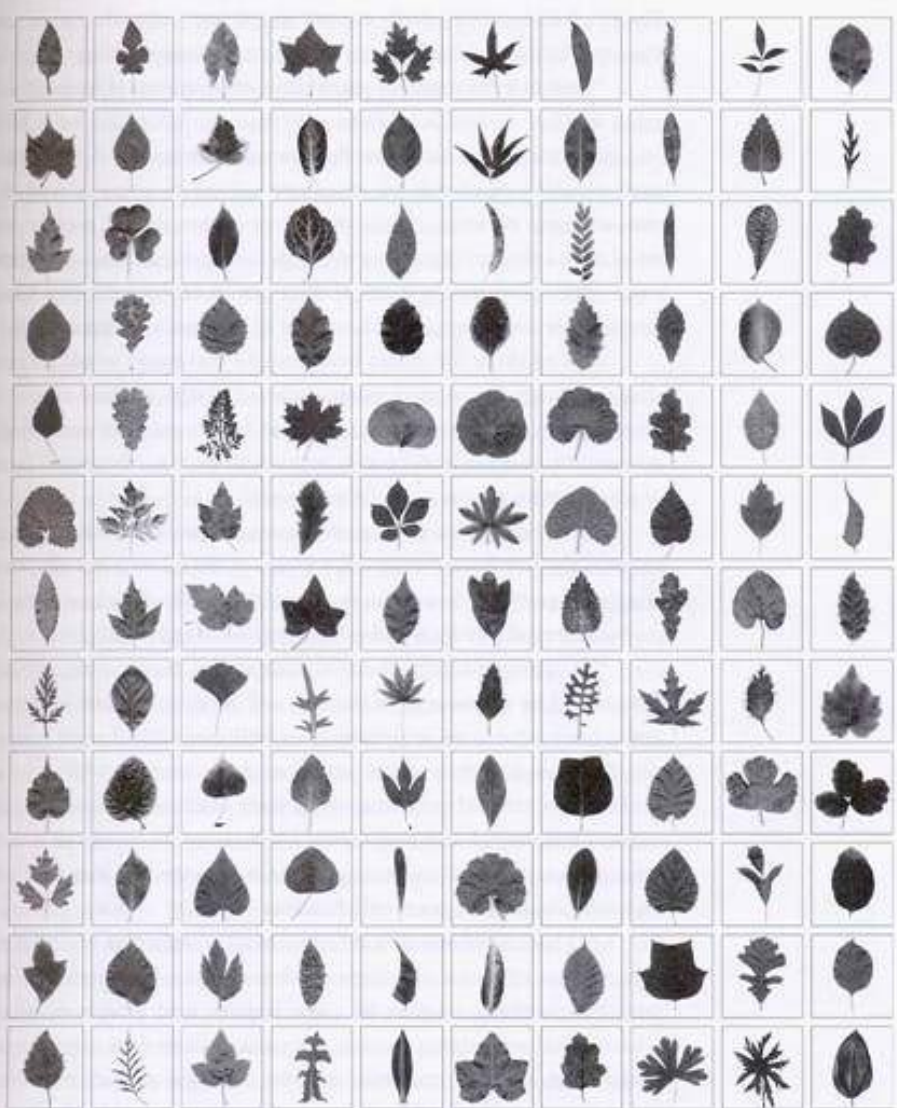


Egg    Two cell    Octant    Globular    Triangular    Heart    Torpedo    Mature embryo

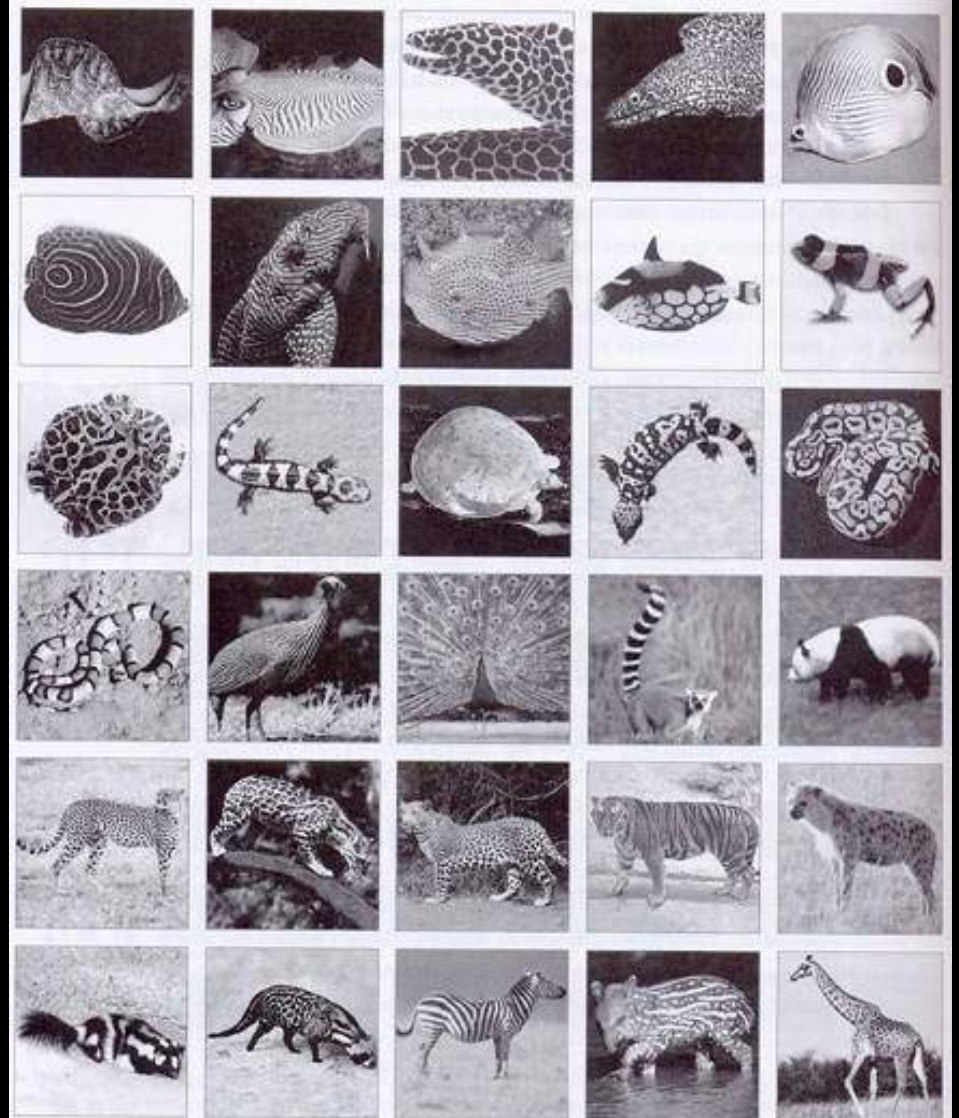


Development of an angiosperm seed: Shepherd's Purse

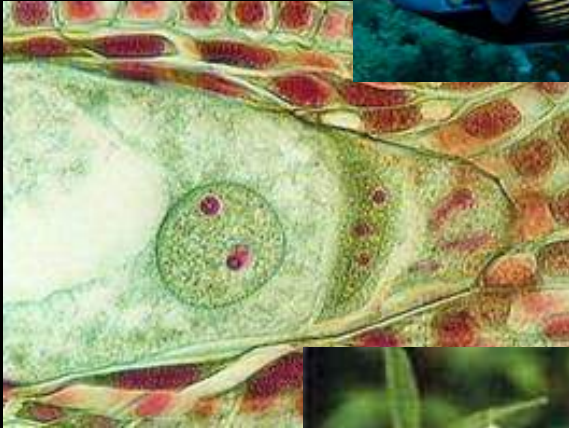
# Astonishing Variety



Examples of different kinds of leaves, mostly from common flowering plants. The diversity of shapes is remarkable, as is the similarity to the forms shown on the facing page. The leaves range in size from under an inch to many feet.

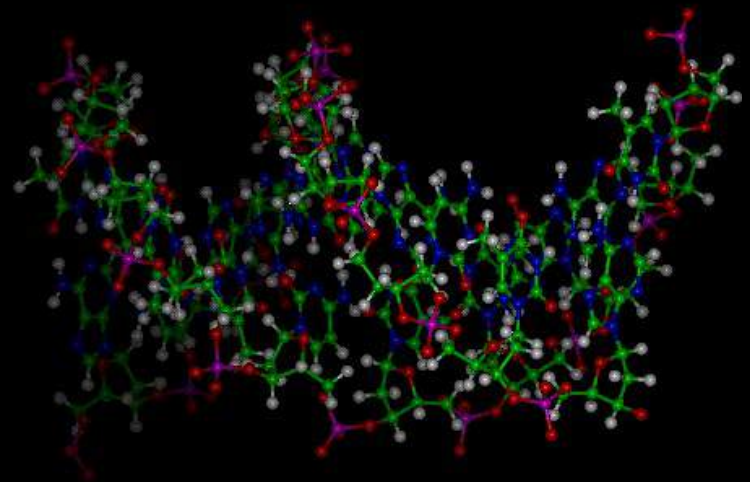
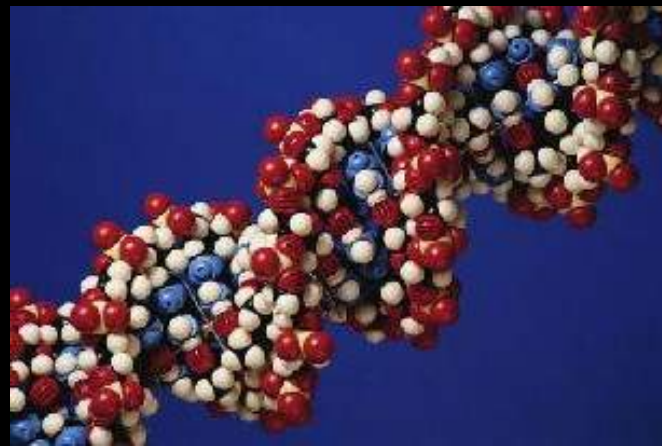
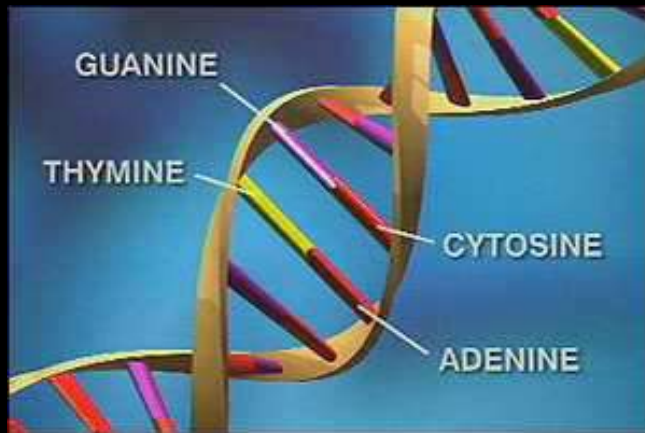


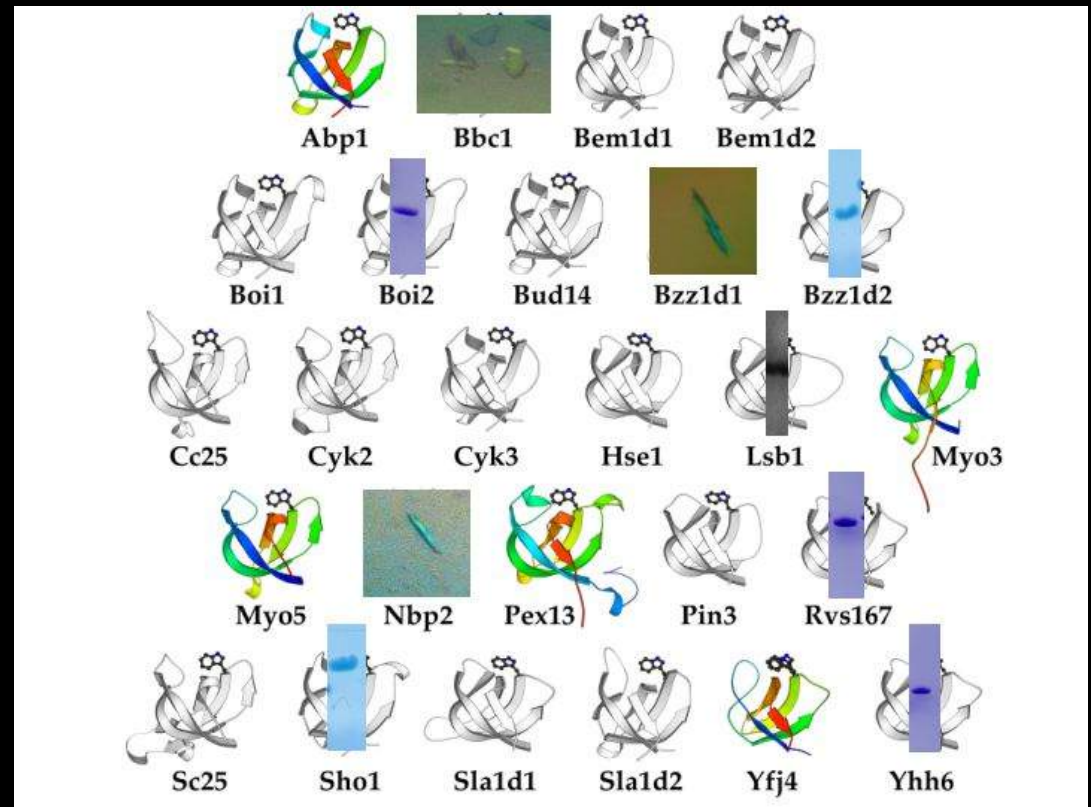
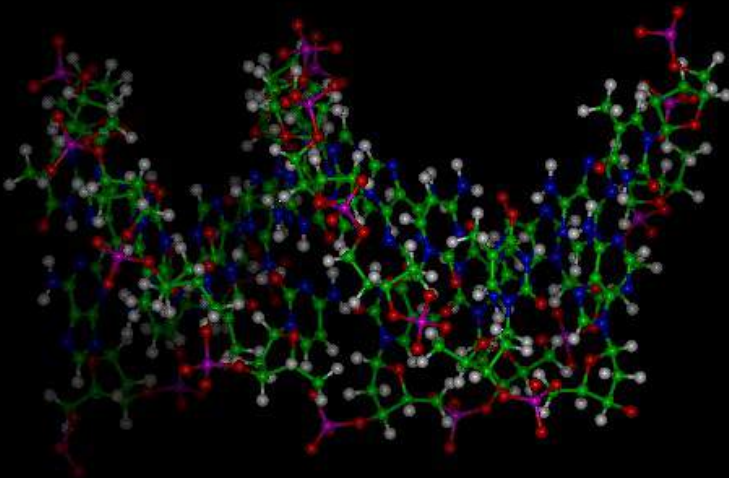
Typical examples of pigmentation patterns on animals. Note that many very different animals end up having remarkably similar patterns.



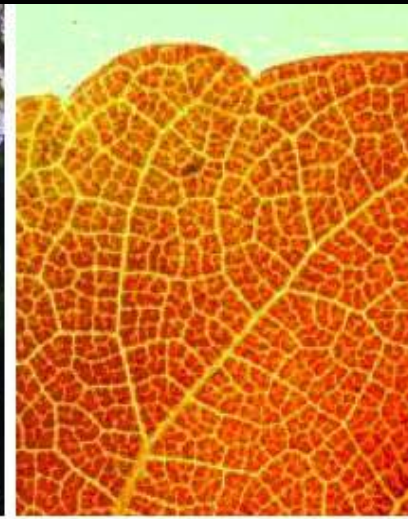
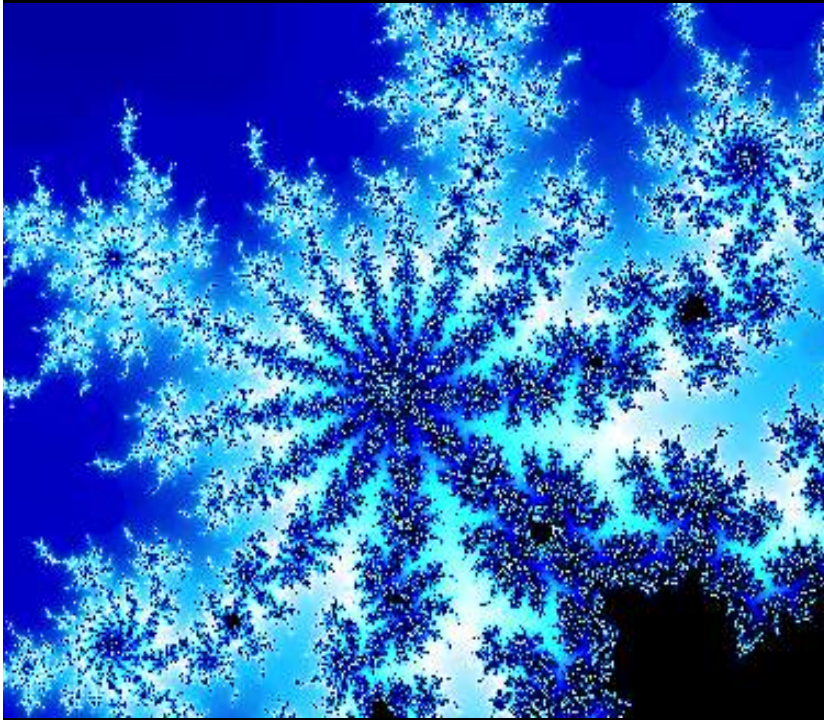
*Astonishing Beauty*

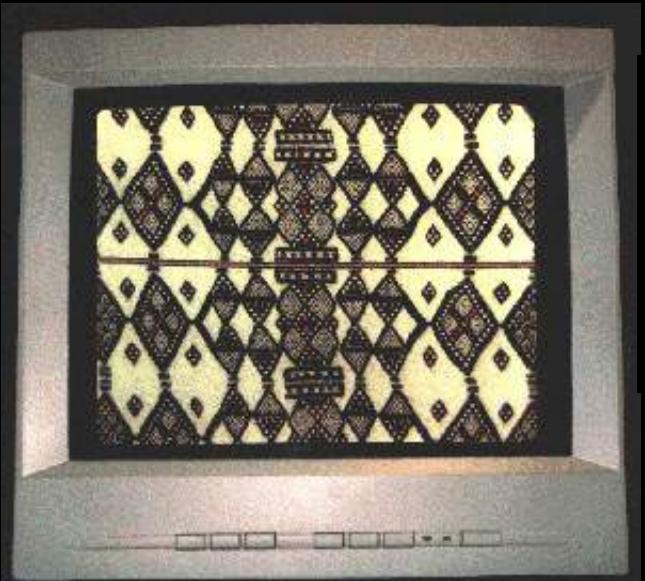






# *Fractals - “scale-free patterns”*

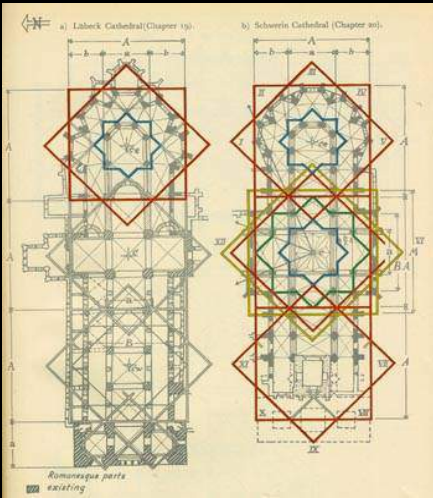
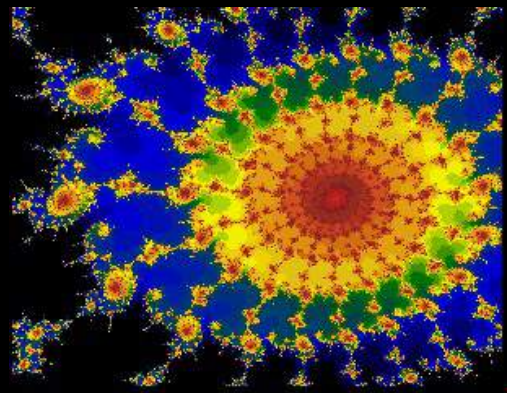
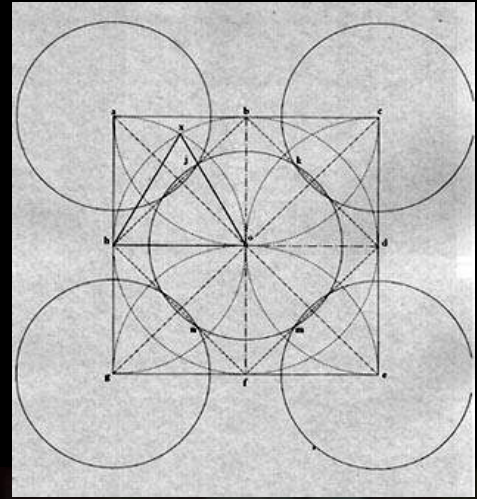
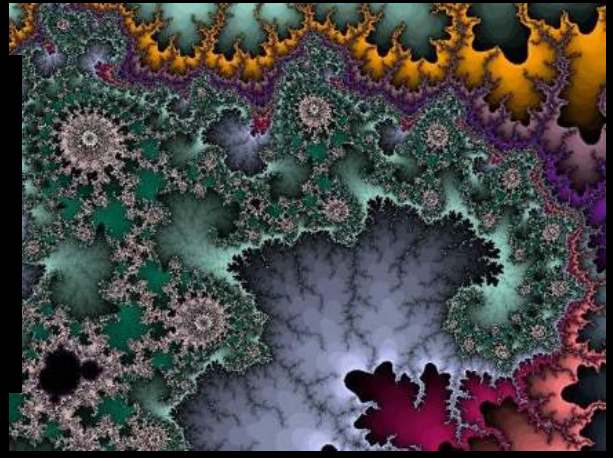
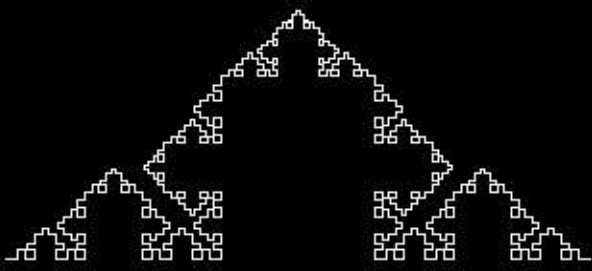




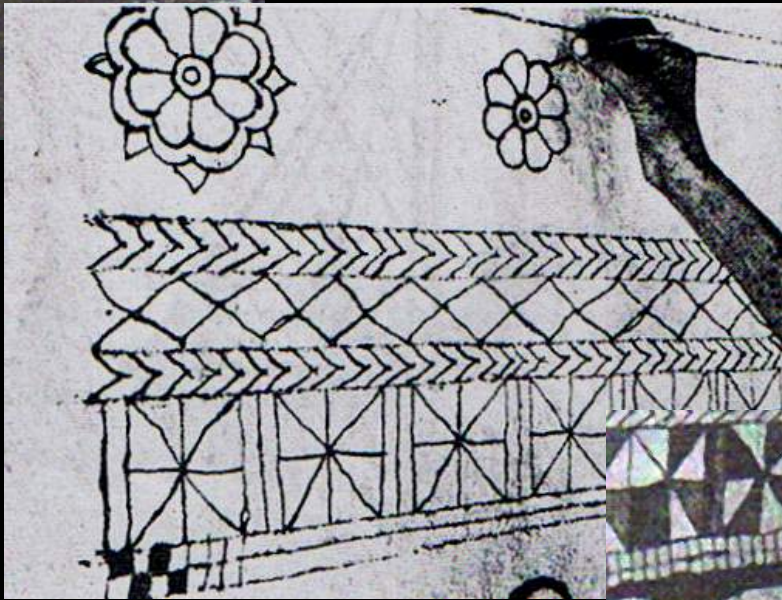
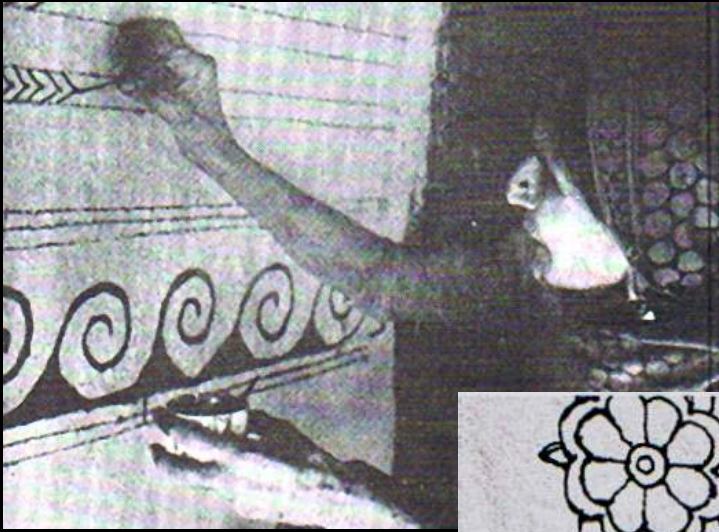
# African Fractals

MODERN COMPUTING AND INDIGENOUS DESIGN

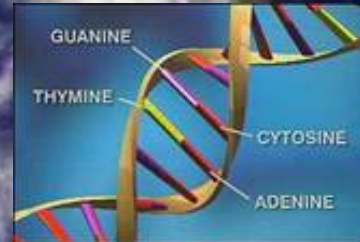
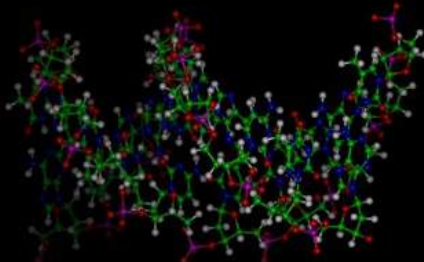
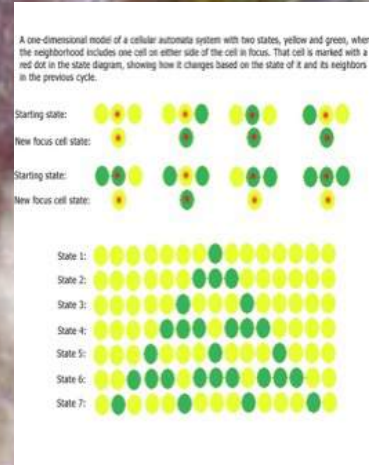
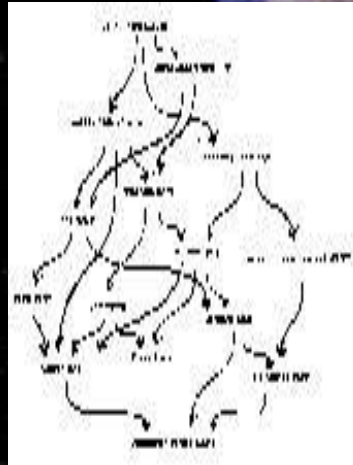
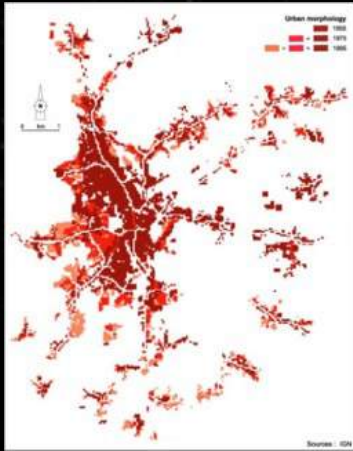
RON EGLASH







# A New Agenda ...



# Sustasis Foundation ([www.sustasis.net](http://www.sustasis.net))

Emphasis on development of a new and more effective generation of capacity-building, “bottom-up” and generative tools: Wiki, pattern languages, etc...

and hyperlinks embedded within layers of the image in easy-to-use fashion. Clicking on some notes would take users to Wiki pages with additional details, or other pop-up information links.

Welcome! Click on a tab below to see the information displayed, or to add your own notes.

BASE FLOOD ELEVATION	BUILDING PERMITS	OCCUPIED	PLAN TO RETURN	ABANDONED/ DEMOLISHED	AVAILABLE TO TRADE	FLAG MY HOUSE TO TRADE	ADD A NOTE
----------------------	------------------	----------	----------------	-----------------------	--------------------	------------------------	------------

Ben Franklin High School

We are coming back in January 2008  
- John Martin 504-792-3812

7129 NE Rocky Brook St  
Sold 02/05/2007: \$242,900

I believe this store is planning to re-open  
- Mandy Smith [ms341@yshoo.com](mailto:ms341@yshoo.com)

ROME PARK

Robert E Lee Blvd

PLANNING TO RETURN  
BUILDING PERMIT PULLED  
ABANDONED  
AVAILABLE TO TRADE

Some pages will provide further information and guidance on specific topics of rebuilding, such as financing, program requirements, code requirements and so on.

# Ward Cunningham:

Inventor of Wiki, co-developer of pattern languages in software, Agile, and other new open-source and collaborative approaches to data, knowledge and action. Board member of Sustasis Foundation.



## TOWN CENTER

(Master Pattern)



### Description:

In this report, Town Centers are defined as urban destinations or locations providing public access to at least three distinct primary uses which may include residential, commercial, civic buildings, government functions, or public green spaces. While variation in architectural or design elements of the built environment are frequently employed in Town Centers, mixed-uses and public access are central to the delineation of a Town Center.

The existing Town Centers identified in this report are spatially restricted to approximately one square mile areas surrounding particular Metro Light Rail transit stops. These locations are recommended for immediate application of the outlined subpatterns to maximize their utility and quality and may be utilized as templates for the development of future Town Centers at additional transit stops along the Metro Light Rail.

### Discussion:

Existing Town Centers suffer from myriad problems including a lack of diversity in primary uses, design elements that discourage utilization of space, public access restrictions, and limitations to the inclusion of marginalized public groups. The limitation of both public and private economic capacities for development restricts the attention of Town Center development to those areas possessing an existing mix of primary uses.

THEREFORE: Town centers are often the central urban destinations that define the perceptions and experience of a city for both residents and visitors. This makes attention to the problems of access, physical design, and economic development in Phoenix's Town Centers of critical importance. Further, town centers can act as the incubators of community within a city as their convergence of mixed uses forces the interface of people with different needs accessing varied services. This suggests the

## FARMERS' MARKET



### Problem statement:

Separation of producer and consumer encourages indifference about where food comes from, and contributes to other serious community health problems.

### Discussion:

The growing trend of producing mass food product and shipping it into cities causes health, economic, social, and environmental damage. The transportation of the food from the farm, to the processing plant, to the packaging plant, to the store causes the item to lose nutritional value. Neighborhoods need places to obtain fresh, nutritious food.

Economically, shipped in food means money is leaving the local community and only creating secondary jobs. It also creates the extra cost of transporting fresh foods, making processed foods cheaper and more appealing to people.

Additionally, it creates a relationship between food and consumer that is impartial and indifferent. Without enough research the eater doesn't know where the food comes from and how much processing it has gone through. There is no enrichment in the economic exchange that goes on at mass supermarkets. Environmentally, processed foods take excess amounts of energy to produce for the amount of nutrition they supply. Large supermarkets with bulk goods induce more vehicle trips in order to transport to the consumers home. Large parking lots outside of these markets also invite primarily vehicle trips discouraging a walkable area from developing around it.

THEREFORE: Install Farmers Markets so that neighborhoods can access healthy, local food, community interaction and local economy stimulation.

- Give neighborhood a farmers market that is visible and easily accessible.
- Place near public transit so that the goods are easily transported back to the home.
- Install a parking area size suitable for the vendor's vehicles and place public restrooms on site.



## STREET MUTATION

[Upward hypothesis: TBD]

**Problem-statement:** Perfectly aligned streets of standard widths can be rigid and lifeless. But incremental variations to street alignment and width can result in unforeseen problems.



**Discussion:** One model of development is for streets to be laid out in perfect alignment, with plots nearly facing them. But there are many other possible forms of street and plot relationship, as history has shown – and many of the most successful grew (or changed) incrementally, without being planned in advance as they caked up. How can we incorporate such a process today?



One problem is procedural. How can such a process occur within the standard platting process that exists in many locations? We have found a relatively simple mechanism, which addresses both street variations and other sequential adaptations. It creates a series of "dummy lots" within a standard platting process (see example at left) and then allows owners to make sequential modifications to them, using a simple process known as "lot line adjustment." The most difficult part of the process is the treatment of the right-of-way, which is typically "dedicated" to the City or other jurisdiction within the platting process. Again, this can be done as a standard or "dummy" tract, and then adjusted through the lot line process.

This requires that the City or other street authority establish very minimum standards for street width, curb design, sidewalks and streetcape elements, and so on. (These can also be expressed as patterns.) In a low-speed, relatively low-volume condition, such standards can be very loose. (See e.g. the work of Hans Monecman and other researchers in the field of so-called "shared space" design.)

Once the standards are established, then the owners are allowed to make their street mutations as they choose, within the minimum standards. The local authority over the streets will review and approve the plans, or the advice of changes needed.

The only other element that is essential is that each successive owner must connect to the end-points established by the previous owner, and do so within exceeding the geometric standards specified by the local authority. The owner may wish to work together to create a shared pattern such as a front courtyard garden or parking area.

Therefore:

Where street mutations are desired within a local development area, create standard or "dummy" street tract, and then specify a nominal, minimum and maximum width. Then each successive owner may establish their own front property line, following the simple rule: connect to the previous adjacent or frontage property line, stay within the minimum and maximum widths, use 1 established curb pattern(s) for that area, and integrate other approved design elements into the streetscape.



[Downward hypothesis: If adjoining owners wish, they can create attached buildings and also make agreements to share features, such as *Front Gardens*, *Patios*, *Squares*, *Shared Parking*, *Etc.*]



## ATTACHED BUILDINGS

[Upward hypothesis: Buildings with *Zero Lot Line Construction* will need to establish protocols for the design and construction of their attached buildings, which are given here. A lot line may be modified by the pattern *Street Mutation*, and then the owners will wish to develop Attached Buildings, given here. ...etc.]

**Problem-statement:** As the plots in a block are built out, there is often a need to create attached buildings incrementally. But this requires that many problems be solved. These include fire protection, water intrusion, and protection of each side in the event the other is modified or demolished.



**Discussion:** Let us suppose that two adjacent plot owners have agreed that they would prefer to build attached buildings, but their plots are not necessarily standardized. One unit may be taller than another, or wider than another. Furthermore, one party may make changes later that will expose parts of the other's wall. In each case, care must be taken to protect the separate buildings from damage by water, fire and other dangers.

This requires that a number of steps be taken to protect each side.

- First, each wall must be built as a fully insulated, weather-protected enclosure, of a type that allows flashing to be installed (see below).
- Second, flashing must be introduced at the top edge where the two buildings abut.
- Third, an air space of approx. 1" must be maintained between the two walls. This gap can be enclosed by a method agreed upon by the parties and the building official, such as caulking with a backer rod at the exposed edges, or covering with a piece of trim.

- Fourth, any elements of one structure that project beyond the surface of another must be built with fire-retardant structure, as required by local building codes.

Therefore:

Where attached buildings are desired, build each building as a free-standing structure, with full sound insulation, moisture protection, and all other engineering requirements. Make sure that the party wall is set up to admit flashing for an adjoining construction, and to maintain a minimum 1-inch air space (i.e. 1/2 inch to the property line on each side). When both structures are complete, the remaining exposed areas and gaps can receive an exterior finish that is agreed by both parties.

Maintain an agreement between the neighbors that specifies how many times modifications may be made, and the relative responsibilities of each for incurred costs. Record this agreement with your local property deed authority.



[Downward hypothesis: A portion of a residential yard may need to accommodate a side yard, given in the pattern *Side Yard House*. Etc...]

# Potential of Federated Wiki:

- Open-source, peer-to-peer resource
- Federated structure promotes evolution
- Able to handle quantitative data
- Transparency of data (click-through)
- Ease of relational modeling in real time

Smallest Federated Wiki  
 emsi.localhost:1111/view/welcome-visitors/view/tier-2-material-scores/nmsi.localhost:1111/cotton-fabric/view/egyptian-cotton-fabric/nmsi.localhost:1111/d3-radar-chart

### 2 Material Scores

Will enumerate the materials by name and link to pages for each material. Individual material pages describe how we arrived at particular sustainability scores.

## Cotton Fabric

### Supply Chain Scenario

Woven cotton fabric using conventionally grown cotton

Try [D3 Radar Chart](#) or compare to [Polyester Fabric](#) first.

# 1x19

Cotton Fabric Tier2, 2007

### Data Sources

California Department of Pesticide Regulation; "Summary of Pesticide Use Report Data 2006 Indexed by Commodity", Cotton and Wool Yearbook 2007, Tables 6,7

### Data Sources

Cotton Water Use Compared/Other Crops, from Cotton, Inc.

## Egyptian Cotton Fabric

### Supply Chain Scenario

Woven cotton fabric using cotton grown in Egypt.

Note: Fabricated data for demonstration purposes only.

California Department of Pesticide Regulation; "Summary of Pesticide Use Report Data 2006 Indexed by Commodity", Cotton and Wool Yearbook 2007, Tables 6,7

# 1x19

Cotton Fabric- Egyptian Cotton Tier2, 2007

### Data Sources

Cotton Water Use Compared/Other Crops, from Cotton, Inc.

### D3 Radar Chart

This chart shows material scores as a percentage of points allocated for a score. A larger figure means a better material.

Smallest Federated Wiki  
 localhost:1111/view/welcome-visitors/view/metabolic-equivalent-of-task/view/metabolic-calculator/view/metabolic-goals/view/d3-radar-chart

## Metabolic Equivalent of Task

The metabolic equivalent of task (MET), or simply metabolic equivalent, is a physiological measure expressing the energy cost of physical activities.

See [Metabolic Calculator](#).

One MET is defined as the ratio of metabolic rate (and therefore the rate of energy consumption) during a specific physical activity to a reference metabolic rate, set by convention to:

- 3.5 ml O<sub>2</sub> kg<sup>-1</sup> min<sup>-1</sup> or equivalently
- 1 kcal kg<sup>-1</sup> h<sup>-1</sup> or
- 4.184 kJ kg<sup>-1</sup> h<sup>-1</sup>

Originally, a MET of 1.0 was considered as the resting metabolic rate (RMR) obtained during quiet sitting. MET values of activities range from 0.9 (sleeping) to 19 (running at 17.6 km/h or a 5:31 mile pace).

The Compendium of Physical Activities was developed for use in epidemiologic studies to standardize the assignment of MET intensities in physical activity questionnaires. Dr. BA Haskell from Stanford University conceptualized the Compendium and developed a prototype for the document.

The Compendium was used first in the Survey of Activity, Fitness, and Exercise (SAFE study - 1992-1993).

## Metabolic Calculator

You lead an active life. How active? Here we compute your daily average activity as a multiple of an idle-hour.

A sedentary person could expect an average of a little less than 24 idle-hours of activity per day. (Sleeping takes less energy than idle waking)

A vigorously active person might average 48 idle-hours a day. That's two days of basal metabolic calories every day. Enjoy seconds every meal.

Physical Activities	8	7.6
sleeping	8	7.6
computer office work	6	12
reading newspaper	1	1.3
sitting eat *	2	3
driving automobile	0.5	1.25
slow bicycling	0.75	5.1
bicycling racing *	0.2	3.2
REMAINDER		3.55
SUM		37

2011 Compendium of Physical Activities

## Metabolic Goals

This [Metabolic Calculator](#) has a few aspirational changes.

Physical Activities	8	7.6
sleeping	8	7.6
computer office work	6	12
reading newspaper	1	1.3
sitting eat *	2	3
driving automobile	0.2	0.5
slow bicycling	0.9	6.12
bicycling racing *	0.4	6.4
REMAINDER		3.50
SUM		40.42

Try rendering these numbers in a [D3 Radar Chart](#).

### D3 Radar Chart

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## Readiness Diagnostic

Upward Hyperlinks: [Regional Plan](#).

**Problem:** Different sites have different levels of readiness for development, requiring different tools.



Not all sites are created equal!

**Discussion:** In some sites will simply not be developed for a certain use. They require specialized tools and an analysis of these sites. A branching set of if-then-else customized tools for the Diagnostic Test.

The Diagnostic Test is in the sub-pattern of the modeling.

**Therefore:** When implementing, identify key issues essential for planning and Neighborhood

Note: No trace



## Town Center

Upward Hyperlinks: [Urban Center](#), [Regional Plan](#). Be sure to use the [Readiness Diagnostic](#) before siting a Town Center.

**Problem:** Just as a neighborhood needs a center, groups of neighborhoods (usually about 4, depending on size) need a larger center, providing walkable access to services providing daily needs.

**Discussion:** People need a coordinated set of resources within walking distance of their homes. Studies show that walking distance is about 1/4 mile, and in certain conditions,



Town Centers bring many essential services within daily access.

**3,000**

Persons in This Model  
(Click to Recalibrate)

## Accessory Live Works

Upward Hyperlinks: [Town Center](#), [Urban Center](#), [Good Neighborhood](#)

**Problem:** Many people want to conduct businesses from home,

neighborhoods can be an activity of businesses -- if planned carefully.

Accessory Live Works provide a way to reduce the need for small business space in a neighborhood. The only place a business building is at the

existing house -- such as in the front yard, or alley. This can be done if codes are revised to allow, and to provide the minimal setbacks and setbacks.

Accessory live works require code changes, such as

such as



Living over the store -- at the edge of a single-family lot!

**3**

Persons in This Model  
(Click to Recalibrate)

**+\$5**

Incremental Tax Income  
Per Capita Per Year

## Mixed Use Building

Upward Hyperlinks: [Urban Center](#), [Town Center](#), [Neighborhood Center](#).



Mixed-use buildings pose many challenges.

Mixed use buildings are often more demanding and expensive, making them more competitive. Yet they have many advantages too.

Among the many challenges of mixed use buildings is the "occupancy separation" between uses can be expensive. Some commercial uses can produce cooking odors and/or noises that can be a problem for residents. Residents can also create problems that

there are many challenges for mixed use buildings. For example, the "20% Rule" is a challenge. The challenge can be slow and complex, resulting in a high risk (especially in suburban areas) with mixed-use buildings).

**50**

Persons in This Model  
(Default - Click to Recalibrate)

**\$16**

(Default) Tax Income  
Per Capita Per Year

### Single-Family Detached Home

Upward Hyperlinks: Town Center, Typical Neighborhood

**Problem:** Many people prefer a detached home on a lot that is large enough to have a yard.



Single Family Detached Home

**Discussion:** The Single-Family Detached (or SFD for short) home is a common type for families and others who prefer ample outdoor space for gardening and other recreation. The type is not right for everyone, however; it requires more maintenance, it can be more expensive, and its use of energy and levels of emissions can be higher. These problems can be mitigated, but it is not easy to do so.

**Therefore:** Within any neighborhood, build a mix of single-family detached homes, alongside other kinds of homes. As a rule of thumb, do not build more than 20 SFD homes without adding some other kinds of homes.

Downward Hyperlinks: Consider Attaching Homes to reduce cost and increase resource efficiency. Smaller lots and attached homes will also reduce Infrastructure Embodied Energy and average Infrastructure Operating Energy. Consider also Making Multi-Family Homes as an even more efficient kind of home.



### Attaching Homes

Upward Hyperlinks: Single-Family Detached Home, Cottage



Uploaded image

**Problem:** Many people can live very happily in an attached home. But we need to be able to model the effect on emissions when they change from detached to attached homes.

**Discussion:** The Single-Family Detached (or SFD for short) home is a common type for families and others who prefer ample outdoor space for gardening and other recreation. But the Single-Family Attached home (or SFA for short) can accommodate many people too – especially when the benefits are more clear. These include lower yard maintenance, lower energy use, lower emissions – and lower cost.

**Therefore:** When changing from single-family detached (SFD) to single-family attached (SFA) homes, calculate the additional benefits of lower energy use, lower emissions, and lower cost.

Downward Hyperlinks: Consider Reducing Infrastructure Embodied Energy with smaller and more compact lots. Consider Orienting Buildings to Sun and Shade to further reduce energy, emissions and cost.



### Reducing Infrastructure Embodied Energy

Upward Hyperlinks: Attaching Homes, Single-Family Detached Homes

**Problem:** How can we reduce the embodied energy from infrastructure per person?

**Discussion:** Infrastructure – streets, pipes, wires, and all the other elements that provide our urban services – takes resources and energy to build and to repair. This energy is less than the energy that infrastructure usually transmits – but it is not zero, and it can add up.

**Therefore:** When considering how to locate and design a home or a neighborhood, consider the effect of infrastructure embodied energy. This factor goes down considerably when more homes are placed closer together, on smaller lots.

Downward Hyperlinks: Consider Reducing Infrastructure Operating Energy too, with a reduction strategy. Also consider a District Energy System to locate energy distribution more efficiently.



NOTE

Next, apply the pattern to your site and set the parameters.

### CALCULATE THE METRICS

Now we can calculate some simple metrics. How many residents are in your identifiable neighborhood area?

What is the greenhouse gas (equivalent) emissions per person in your neighborhood area?

Here are the resulting values:

Source: Mehaffy, M.W. (2014) "Counting Urban Carbon." [citation](#)

**19.2**

New Emissions per Capita  
( metric tons )

As we add other patterns, we can explore ways to reduce carbon emissions while making choices based on other criteria.

**1,760**

Total Residents  
( units )

### EXPLORE NEXT PATTERN

Define the [Density Rings](#) that provide choice of density within an overall compact walkable form. Include a [Web of Transportation](#) to provide convenient, well-connected transportation choices.

Provide for a [Web of Shopping and Activities](#) to create a complete neighborhood, with all the typical activities of

## FEDERATED WIKI:

- *Predictive outcomes can be modeled with recognized methodologies*
- *Improvements can be easily made by a community of developers*
- *Format is simple and user-friendly*
- *NOT a black box - sources are all hyperlinked*

## Identifiable Neighborhood Network

Establishes the basic neighborhood structure.

**Problem:** People need an identifiable spatial unit to belong to, that provides a framework for meeting their needs within the city. It must have a spatial layout that promotes the ability to walk and to interact with others.



The Neighborhood

**Upward Hyperlinks:** [WikiPLACE Alpha Test, Start Tool - Set Baseline](#)

**Discussion:** There is a growing body of research that shows that walkable neighborhoods have many advantages, including lower greenhouse gas emissions per capita. In particular, there is evidence that a spacing of principal through streets at a rough grid of 1/4 mile (400m) is close to an optimum spacing.

See for example [Mehaffy, Porta, Rofe and Salingeros, "Urban nuclei and the geometry of streets: The 'emergent neighborhoods' model"](#) - citation ☞

**Therefore:** Identify an area that can accommodate the basic complements of neighborhood life: shopping, recreation, homes, workplaces. Place a Network of Through Streets at no more than 1/4 mile within this structure. Provide for retail and commercial Mixed Use along these through streets, especially at intersections.

### ACTIVATE THE PATTERN

Next, apply the pattern to your site and set the parameters.

### CALCULATE THE METRICS

Now we can calculate some simple metrics. How many residents are in your identifiable neighborhood area?

What is the greenhouse gas (equivalent) emissions per person in your neighborhood area?

Here are the resulting values:

Source: [Mehaffy, M.W. \(2014\) "Counting Urban Carbon."](#), citation ☞

**19.2**

New Emissions per Capita  
(metric tons)

As we add other patterns, we can explore ways to reduce carbon emissions while making choices based on other criteria.

**1,760**

Total Residents  
(units)

### EXPLORE NEXT PATTERN

Define the **Density Rings** that provide choice of density within an overall compact walkable form. Include a **Web of Transportation** to provide convenient, well-connected transportation choices.

Provide for a **Web of Shopping and Activities** to create a complete neighborhood, with all the typical activities of daily travel nearby.

**HINT:** You can always go back to previous patterns (including those listed in the "Upward Hyperlinks" section above) and refine your choices. When you are ready to display the final result, click on **Analyze and Display**.



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older

## Density Rings

Sets the pattern of overall density within a neighborhood, creating zones with greater or lesser density.

**Problem:** Urban density can provide a number of advantages. But people vary in their desire to be close to other people, activities and services, or alternatively, to be in quieter areas with more space. These varied desires require variations of density within a neighborhood, so that people have choices during the day, and over a lifetime.



Variations in neighborhood density offer choices

**Upward Hyperlinks:** [\(Identifiable Neighborhood Network.\)](#)

**Discussion:** Research shows a strong correlation between increases in density and a number of urban benefits, including the reduction of greenhouse gas emissions per capita. But this factor must be balanced with other factors. citation ☞

**Therefore:** Set the overall density within the neighborhood. Create ring-like zones with greater or lesser density. Greater density is generally advantageous, but a range should be provided to meet varied needs and preferences.

### IMPLEMENT THE PATTERN

Change the density value below from the baseline. View the results in the "Metrics" section below that, and adjust as desired.

**13 Revised Dwelling (Units / Acre)**

### CALCULATE THE METRICS

Following are the predicted results of your change. First, the percentage change in the density from the baseline:

**130**

Percent Change

Here are the resulting values:

Source: [Mehaffy, M.W. \(2014\) "Counting Urban Carbon"](#)

**18.1**

New Emissions per Capita  
(metric tons)

As we add other patterns, we can explore ways to reduce carbon emissions while making choices based on other criteria.

**1,760**

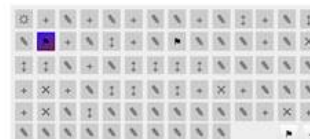
Total Residents  
(units)

### EXPLORE NEXT PATTERN

Provide for a **Web of Shopping and Activities** to create a complete neighborhood, with all the typical activities of daily travel nearby.

Include a **Web of Transportation** to provide convenient, well-connected transportation choices.

**HINT:** You can always go back to previous patterns (including those listed in the "Upward Hyperlinks" section above) and refine your choices. When you are ready to display the final result, click on **Analyze and Display**.



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older

## Web of Shopping and Activities

Creates a network of destinations serving daily needs and activities.

**Problem:** People need a network of close-by resources that can meet their daily needs, including shopping, recreation, schools, places of work and other daily activities.

**Upward Hyperlinks:** [Density Rings, Web of Transportation, Identifiable Neighborhood](#)

**Discussion:** The web of transportation... etc

**Therefore:** Create a network of destinations serving daily needs and activities, and integrated with the **Web of Transportation** and the **Network of Through Streets**. Provide **Neighborhood Centers** at the nodes, which will allow small shops and other activities to form.

### IMPLEMENT THE PATTERN

Score your project's performance on this pattern, with a value from 1 to 10. 5 means "meets the pattern with minimal adequacy." 10 is "meets the pattern to maximum effective degree." 0 is "does not meet the pattern at all." (The default value is 5 -- if you don't know what your score is, leave this value in place.)

**8 Web of Shopping and Activities**

### CALCULATE THE METRICS

Below are the predicted results of your change.

**18.1 New Emissions per Capita**  
**8 Web of Shopping and Activities**  
**16.65 Emissions \* (100-Web)/100**

**16.65**

New Emissions per Capita  
(metric tons)

**30,194**

Total Neighborhood GHG  
Equivalent Emissions  
(metric tons units)

Source: [Mehaffy, MW \(2013\), "Prospects for scenario-modelling urban design methodologies to achieve significant greenhouse gas emissions reductions."](#) citation ☞

### EXPLORE NEXT PATTERN

Include a **Web of Transportation** to provide convenient, well-connected transportation choices.

**HINT:** You can always go back to previous patterns (including those listed in the "Upward Hyperlinks" section above) and refine your choices. When you are ready to display the final result, click on **Analyze and Display**.



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older

## Web of Transportation

Creates a network of multi-modal interchanges that provide transportation connectivity.

**Problem:** The system of transportation can only work efficiently if all the parts are well connected.

**Upward Hyperlinks:** [Identifiable Neighborhood, Density Rings](#)

**Discussion:** The web of transportation... etc

**Therefore:** Create a network of multi-modal interchanges, spaced approx. 1/4 mile (400m) apart. Make larger interchanges further apart (e.g. 1/2 mile, 1 mile etc). At each **interchange**, bring together the modes of transportation, including walking, biking, driving, bus, streetcar, rail and other modes. Assure that a **Network of Through Streets** connects well to the interchanges.

### IMPLEMENT THE PATTERN

Score your project's performance on this pattern, with a value from 1 to 10. 5 means "meets the pattern with minimal adequacy." 10 is "meets the pattern to maximum effective degree." 0 is "does not meet the pattern at all." (The default value is 5 -- if you don't know what your score is, leave this value in place.)

**5 Web of Transportation**

A rating of 5 corresponds to an average US city (not a suburb).

### CALCULATE THE METRICS

Below are the predicted results of your change, based on empirical study of neighborhoods with comparable changes.

**16.65 New Emissions per Capita**  
**5 Web of Transportation**  
**15.82 Emissions \* (100-Web)/100**

**15.81**

New Emissions per Capita  
(metric tons)

**30,194**

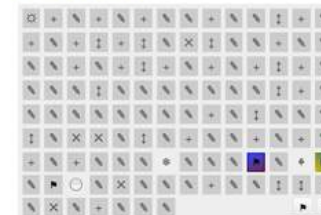
Total Neighborhood GHG  
Equivalent Emissions  
(metric tons units)

Source: [Ewing, R., Bartholomew, K., Winkelmann, S., Walters, J., & Chen, D. \(2009\). Growing cooler: the evidence on urban development and climate change. Renewable Resources Journal, 25\(4\), 6-13.](#) citation ☞

### EXPLORE NEXT PATTERN

**HINT:** You can always go back to previous patterns (including those listed in the "Upward Hyperlinks" section above) and refine your choices.

When you are ready to display the final result, click on **Analyze and Display**.



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## Readiness Diagnostic

Upward Hyperlinks: [Regional Plan](#).



Not all sites are created equal!

**Problem:** Different sites have different levels of readiness for development, requiring different tools.

**Discussion:** In some cases, sites will simply not be ready for development for a number of years, and even then they may require specialized tools. The Readiness Diagnostic provides an analysis of these requirements. A series of tests provide a branching set of if-then actions, leading to a set of customized tools for each site.

The Diagnostic process is completed in the sub-pattern **Diagnostic Test**. After you have completed entering the data in the sub-pattern, you can return to this pattern to continue the modeling.

**Therefore:** When preparing a development plan, or an implementation of an existing plan, use the diagnostic tool to identify key issues and opportunities. The diagnostic tool is essential for **place patterns** like **Urban Center**, **Town Center** and **Neighborhood Center**. You may also decide that the first step is to create a **Neighborhood Renaissance Center**.

Note: No tracking metrics are associated with this pattern.



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## Neighborhood Renaissance Center

Upward Hyperlinks: [Readiness Diagnostic](#).



Neighborhood Renaissance Center brings together ideas and solutions

**Problem:** The principal coordination needed of city services comes down to coordination within localized places. This is at once the most difficult kind of coordination, and the most necessary.

**Discussion:** The scale of the neighborhood is the most important when it comes to many of the activities we engage in within cities and towns — especially those that relate to the building and modifying of the neighborhood itself. Individuals need many resources to build and modify their homes and businesses in a way that complements the neighborhood structure. In some cases they simply need to be able to enforce planning requirements and code limitations. But they need more than limitations: they need positive guidance.

A more complete discussion of this issue can be found at <http://www.tectics.com/NRCs.htm>.

**Therefore** To develop the social and physical capital of a neighborhood more fully, establish a **Neighborhood Renaissance Center** in a convenient location in the neighborhood. Provide a **Design Library of Pre-Approved Plans**, **Project Pattern Languages** and **Technical Guidelines**. Create a **Community Design Wiki** that allows people to build and exchange information.



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## Community Design Wiki

Upward Hyperlinks: [Neighborhood Renaissance Center](#).



Wiki GIS page

**Problem:** People need to be able to share information, and grow the body of information they share as they improve it. This information needs to be displayed geographically.

**Discussion:** People need to be able to exchange information about planned projects, links to resources, and technical information, coordinated to a geographic display of the neighborhood. In this way, people can see patterns forming, and participate in the further development of those patterns.

**Therefore:** Create a Geographic Information System, designed as a Wiki, that provides information and guidance on specific topics of rebuilding, such as financing, program requirements, code requirements and so on. Provide the ability to include modular elements of information that the user can collect for their own project. The information can then be easily plugged into the user's own project pattern language, which can then better reflect the requirements and interactions for their own specific project.

Include links to **Pre-Approved Plans**, **Neighborhood Pattern Language**, and **Home Pattern Language**.



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## Pre-Approved Plans

Upward Hyperlinks: [Neighborhood Renaissance Center](#), [Design Library](#).



Pre-Approved Plans assure that residents can quickly and cost-effectively approve compatible plans.

**Problem:** One of the biggest problems for building structures that are compatible with a local neighborhood is the expense and delay of the permitting process — particularly when it involves customized plans.

**Discussion:** People need access to plans that are compatible with an existing neighborhood, but that are not cookie-cutter plans. These plans can be adjusted to meet user needs, and to take on distinctive features so as to avoid an oppressive sameness. But they can also be pre-approved by the City plans examiners, and by the stakeholders of the community.

**Therefore:** Work with the City Planning and Building departments to create a library of pre-approved plans of the kinds of buildings that residents would like to have in their neighborhood. Include modular elements that can be added and subtracted to make the plans easy to modify to meet needs. Provide a **Financing Information Guide** to help owners to secure financing for their project. Consider hiring a **Barefoot Architect** to make small modifications to the plans to better fit their needs. Provide **Pattern Books** to guide owners and builders in the details of their plans.



origin

### Readiness Diagnostic

Upward Hyperlinks: [Regional Plan](#).

**Problem:** Different sites have different levels of readiness for development, requiring different tools.



Not all sites are created equal!

**Discussion:** In some cases, sites will simply not be ready for development for a number of years, and even then they may require specialized tools. The Readiness Diagnostic provides an analysis of these requirements. A series of tests provide a branching set of if-then actions, leading to a set of customized tools for each site.

The Diagnostic process is completed in the sub-pattern **Diagnostic Test**. After you have completed entering the data in the sub-pattern, you can return to this pattern to continue the modeling.

**Therefore:** When preparing a development plan, or an implementation of an existing plan, use the diagnostic tool to identify key issues and opportunities. The diagnostic tool is essential for **place patterns** like **Urban Center**, **Town Center** and **Neighborhood Center**.

Note: No tracking metrics are associated with this pattern.



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### Town Center

Upward Hyperlinks: [Urban Center](#), [Regional Plan](#). Be sure to use the [Readiness Diagnostic](#) before siting a **Town Center**.



Town Centers bring many essential services within daily access.

**Problem:** Just as a neighborhood needs a center, groups of neighborhoods (usually about 4, depending on size) need a larger center, providing walkable access to services providing daily needs.

**Discussion:** People need a coordinated set of resources within walking distance of their homes. Studies show that walking distance is about 1/4 mile, and in certain conditions, can be increased to 1/2 mile.

Beyond this distance, they need public transportation to take them to more distant resources. A coordinated approach will organize a transit stop within the **Town Center**.

**Therefore:** Designate a **Town Center** as a node within a walkable pedshed of maximum 1/2 mile radius.

Include the following **place elements**: **Transit Stop**, **Mixed Use Building**. Consider including: **Live Work Rowhouse**, **Cottage**, **Townhouse**, **Multi-Family Residential Building**, **Accessory Live Works**

Consider including the following **process elements**: **SmartCode**, **Tax-Increment**

**3,000**  
Persons in This Model  
(Click to Recalibrate)

**\$120**  
(Default) Tax Income Per Capita Per Year

**120 KG**

### Mixed Use Building

Upward Hyperlinks: [Urban Center](#), [Town Center](#), [Neighborhood Center](#).



Mixed-use buildings pose many challenges.

**Problem:** Mixed use buildings are technically demanding and tend to be expensive, making them uncompetitive. Yet they offer important advantages too.

**Discussion:** Among the many challenges of mixed use buildings, the "occupancy separation" between uses can cause significant expense. Some commercial uses, such as restaurants, produce cooking odors and/or noises that disturb residents. Residents can also create problems that interrupt business.

More significantly, there are regulatory burdens for mixed use buildings that can make them unfeasible. For example, Fannie Mae has a "20% Rule" that limits commercial to 20% of gross square footage. The permitting process can be slow and complex, resulting in significant delay and risk (especially in suburban jurisdictions not familiar with mixed-use buildings).

**Therefore:** Use a **Readiness Diagnostic** to be sure the market is ready for a mixed use building type. Then use a **Pre-Approved Type** to simplify the planning and entitlement process, and reduce risk.

**50**  
Persons in This Model  
(Default - Click to Recalibrate)

**\$16**  
(Default) Tax Income Per Capita Per Year

### Mixed-Use Lending Instrument

Upward Hyperlinks: [Mixed Use Building](#), [Live Work Rowhouse](#), [Accessory Live Works](#).



Mixed use lending is complex and often difficult to secure.

**Problem:** It is difficult to finance mixed-use projects, because they are perceived as complex and risky.

**Discussion:** Mixed use projects are in fact more complex and relatively riskier than single-use projects, because of their greater complexity of uses and, often, of construction. But part of the problem is simply that lenders are unfamiliar with this kind of project, and unwilling to take on risk that is not well understood and not well identified.

A simple way to deal with this challenge is to create standardized lending instruments, which pre-package the projects into a standardized portfolio. These instruments also set guidelines that are coordinated with the standardized entitlement and permitting approval requirements for mixed use projects.

**Therefore:** Create standardized mixed use lending instruments, working in partnership with area bankers. Apply loan guarantees where feasible, and where the risk is justified.

Note: No tracking metrics are associated with this pattern.



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## Welcome Visitors

Welcome to the **Smallest Federated Wiki** for the **Envision Tomorrow Carbon Modeling** project.

This project offers a 'toolkit' of proven resources for creating livable, prosperous neighborhoods, cities, suburbs and towns. Each tool is designed to 'plug and play' with the other tools, forming a coordinated toolkit that is powerful but easy to use.

This module has several notable features:

- It tracks **performance metrics** for variables like cost, savings, tax cost, resource use, and greenhouse gas emissions. As you work with several tools in combination, you can see how these metrics are likely to perform, and to change based on your choices. In this way, Build Tomorrow serves as a **predictive model** of these metrics.

- It uses an advanced **wiki format**, which means that the information and resources can grow and become more accurate and useful. People who develop new tools, or new ways of using existing tools to achieve better results, can share that information, and others can thereby build more useful toolkits. Significant local improvements can also be uploaded to the main system, making it progressively smarter too. (This kind of improvement process is based on the Github open-source model of Linus Torvalds.)

- It uses a **pattern language** format, which means the tools can interface with each other as elements of 'object-oriented design.' In plain language, the tools work together to help you to make a design that is a better 'fit' with your unique set of problems. (This system is in widespread use today, especially within computer software.)

- It is designed to form a module within the **Envision Tomorrow** system, an open-source scenario-modeling tool developed by Fregonese and Associates, and now in development at the University of Utah. It will allow those using Envision Tomorrow to go beyond scenario

## Feeling Map Diagnostic

*Upward Hyperlinks:*  
*Readiness Diagnostic*

**Problem: Qualitative characteristics play a huge but often under-appreciated role in our lives. They are so important that if we don't account for them, a project is not likely to be successful. But our methods for doing so are crude and quantitative.**



A Feeling Map "cluster map" showing different patterns of evaluation by color

**Discussion:** The technology of our age has historically been much better at managing quantitative factors than qualitative ones. To handle qualitative factors, we usually rely upon 'genius artists' to come and provide aesthetic characteristics, almost as a kind of cloak over the quantitatively determined parts. (We put an exotic 'styled' body over the 'guts' of the car, for example.)

Occasionally we are better at integrating these two factors -- but too rarely. The problem is especially acute when dealing with designs with multiple sub-parts that need to 'go together' in a more organic way. Parts of neighborhoods and cities are very good examples. How can we do this?

The "feeling map" is what is known as a 'consensus methodology' -- a way of combining many smaller qualitative evaluations into a larger, more reliable diagnostic map. Such maps can be used

**Therefore: When beginning a project, always go through a qualitative diagnostic, and use a feeling map to identify the areas to be repaired, improved or preserved.**

*Downward Hyperlinks: Use the Feeling Map Tool to work with a group to get measurements. Use the Feeling Map Processor to compile the results.*

## Feeling Map Tool

To use this tool, drag your project map into the GPS-activated window below, and set the correct scale:



Click [HERE](#)



Control Panel

Then have others on your team load this tool onto their handheld, and use the buttons below to mark their evaluations as they navigate the project area.

### Feeling Map Display



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## Feeling Map Display



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### WikiPLACE Carbon Modeling Project

Welcome to the start page for the WikiPlace Carbon Modeling Project. If you want to jump into a demonstration, click on this link:  
[Residential Neighborhood](#)  
 Or to learn more, just keep reading!  
 This module has several notable features:  
 - It tracks performance metrics for variables like cost, savings, tax cost, resource use, and greenhouse gas emissions. As you work with several tools in combination, you can see how these metrics are likely to perform, and to change based on your choices. In this way, Build

### Residential Neighborhood

This is the **Place Pattern** for a neighborhood of homes. It establishes the characteristics of the homes within a residential neighborhood, and it allows you to see how changes are likely to affect its performance in a number of ways. These measurements are called **metrics**.



### Single Family Detached Residences

Many people want to live in residences surrounded by yards and gardens, and not touching other homes. Larger families with children especially find these homes desirable. These isolated structures are separated by lot boundaries with no shared services beyond the street.



Single Family Residences are desired by many people

### Single Family Attached Residences

Many people do not want to care for large yards or pay the expense of a large lot. They prefer attached homes -- structures that share at least one wall with adjacent structures, and typically share sanitary and storm sewer services. Couples without children or with only one or two children, and those whose children are grown, often prefer this kind of home, especially if it is in a walkable neighborhood.



Many people love the convenience of attached homes

### Compact Neighborhood

One way to make a neighborhood more efficient -- and even more enjoyable to live in -- is to reduce the amount of land used by residences. That will improve energy efficiency, resource use, and cost. It will also allow people to walk more easily, and see their neighbors.



Many people love to live in compact, walkable neighborhoods

#### GREENHOUSE GAS EMISSIONS

Homes in more compact neighborhoods tend to have lower emissions than those in other neighborhoods, because the yards are smaller, requiring less water and other resources. People also tend to drive less, and drive shorter distances.

First, we take a baseline of density, an average of many cities in the USA, 8 homes per acre.

8 Standard Density

Then we specify a factor to increase the density (as a baseline, 1.2, or 25% more dense). This number is applied to a function (a factor that adjusts the result) representing difference that is predicted by empirical research [citation needed].

1.2 Neighborhood Density Increase  
 8 Standard Density  
 9.6 Standard Density \*

#### GREENHOUSE GAS EMISSIONS

Attached residences tend to have lower emissions than single family (detached) residences, because their shared walls are more energy efficient. In addition, the yards tend to be smaller, requiring less water and other resources.

First, we apply a predictive delta to the baseline of GHG emissions per person. This number is an average of the difference that is predicted by empirical research [citation needed].

18 MtCO2e per Person per Year  
 0.9 Factor  
 16.2 MtCO2e per Person per Year \*

Now we change the allocation of attached residences in the neighborhood:

## Tax Revenue Pattern Language Municipality Return on Investment Calculator (Example by Joe Minicozzi)

### Tax Return Modeler

This tool enables you to calculate the tax return on a proposed building project, and compare it to long-term maintenance costs and other externalities.

To start, we'll enter the size of the project along with the annual property tax paid. Then you'll see what the return per acre is:

221000 Total Property Tax  
 34 Total Acres  
 6500 Property Tax per Acre

Next, enter the total expected retail taxes for the project. Then you will also see the retail taxes per acre.

1615000 Total Sales Tax  
 34 Total Acres  
 47500 Sales Tax per Acre

Next, enter the total number of jobs. Again, you will see displayed the jobs per acre.

200 Total Jobs  
 34 Total Acres  
 5.88 Total Jobs per Acre

Now, here is where you can begin to see the cost-effectiveness of the project over time. First, the total income per acre:

6500 Property Tax per Acre  
 47500 Sales Tax per Acre  
 54000 Total Income per Acre

### Comparison Project 1

Again, enter the project size and annual property tax paid, to get the yield per acre:

126800 Total Property Tax  
 0.2 Total Acres  
 634000 Property Tax per Acre \*

Retail taxes:

16720 Total Sales Tax  
 0.2 Total Acres  
 83600 Sales Tax per Acre \*

And total number of jobs:

15 Total Jobs  
 0.2 Total Acres  
 75 Total Jobs per Acre \*

Now the total return after externality costs, and return per acre. (Enter a new externality cost per acre if you have it.)

634000 Property Tax per Acre  
 83600 Sales Tax per Acre  
 717600 Total Income per Acre \*

And the return on public investment:

717600 Total Income per Acre  
 3000 Annual EC per Acre  
 239.2 Return on Public Investment \*

### Comparison Project 2

Again, enter the project size and annual property tax paid, to get the yield per acre:

126800 Total Property Tax  
 1 Total Acres  
 126800 Property Tax per Acre \*

Retail taxes:

16720 Total Sales Tax  
 1 Total Acres  
 16720 Sales Tax per Acre \*

And total number of jobs:

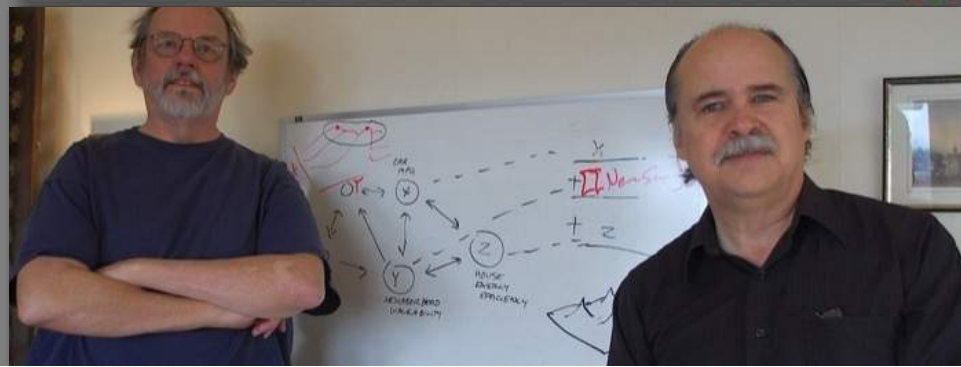
15 Total Jobs  
 1 Total Acres  
 15 Total Jobs per Acre \*

Now the total return after externality costs, and return per acre. (Enter a new externality cost per acre if you have it.)

126800 Property Tax per Acre  
 16720 Sales Tax per Acre  
 143520 Total Income per Acre \*

And the return on public investment:

143520 Total Income per Acre  
 3000 Annual EC per Acre  
 47.84 Return on Public Investment \*





# Identifiable Neighborhood Network

Establishes the basic neighborhood structure.

**Problem:** People need an identifiable spatial unit to belong to, that provides a framework for meeting their needs within the city. It must have a spatial layout that promotes the ability to walk and to interact with others.



The Neighborhood

*Upward Hyperlinks:*  
[WikiPLACE Alpha Test, Start Tool - Set Baseline](#)

**Discussion:** There is a growing body of research that shows that walkable neighborhoods have many advantages, including lower greenhouse gas emissions per capita. In particular, there is evidence that a spacing of principal through streets at a rough grid of 1/4 mile (400M) is close to an optimum spacing.

See for example *Mehaffy, Porta, Rofe and Salingaros, "Urban nuclei and the geometry of streets: The 'emergent neighborhoods' model" - citation*

**Therefore:** Identify an area that can accommodate the basic complements of neighborhood life: shopping, recreation, homes, workplaces. Place a Network of Through Streets at no more than 1/4 mile within this structure. Provide for retail and commercial Mixed Use along these through streets, especially at intersections.

ACTIVATE THE PATTERN

Next, apply the pattern to your site and set the parameters

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ACTIVATE THE PATTERN

Next, apply the pattern to your site and set the parameters.

CALCULATE THE METRICS

Now we can calculate some simple metrics. How many residents are in your identifiable neighborhood area?

What is the greenhouse gas (equivalent) emissions per person in your neighborhood area?

Here are the resulting values:

Source: *Mehaffy, M.W. (2014) "Counting Urban Carbon."*  
[citation](#)

19.2

As we add other patterns, we can explore ways to reduce carbon emissions while making choices based on other criteria.

New Emissions per Capita  
(metric tons)

1,760

Total Residents  
(units)

EXPLORE NEXT PATTERN

Define the **Density Rings** that provide choice of density within an overall compact walkable form. Include a **Web of Transportation** to provide convenient, well-connected transportation choices.

Provide for a **Web of Shopping and Activities** to create a complete neighborhood, with all the typical activities of daily travel nearby.

**HINT:** You can always go back to previous patterns (including those listed in the "Upward Hyperlinks" section above) and refine your choices. When you are ready to display the final result, click on **Analyze and Display**.



# Density Rings

Sets the pattern of overall density within a neighborhood, creating zones with greater or lesser density.

**Problem:** Urban density can provide a number of advantages. But people vary in their desire to be close to other people, activities and services, or alternatively, to be in quieter areas with more space. These varied desires require variations of density within a neighborhood, so that people have choices during the day, and over a lifetime.



Variations in neighborhood density offer choices

Upward Hyperlinks: ([Identifiable Neighborhood Network](#).)

**Discussion:** Research shows a strong correlation between increases in density and a number of urban benefits, including the reduction of greenhouse gas emissions per capita. But this factor must be balanced with other factors. [citation](#)

**Therefore:** Set the overall density within the neighborhood. Create ring-like zones with greater or lesser density. Greater density is generally advantageous, but a range should be provided to meet varied needs and preferences.

### IMPLEMENT THE PATTERN

Change the density value below from the baseline. View the results in the "Metrics" section below that, and adjust

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**Therefore:** Set the overall density within the neighborhood. Create ring-like zones with greater or lesser density. Greater density is generally advantageous, but a range should be provided to meet varied needs and preferences.

### IMPLEMENT THE PATTERN

Change the density value below from the baseline. View the results in the "Metrics" section below that, and adjust as desired.

13 Revised Dwelling (Units / Acre)

### CALCULATE THE METRICS

Following are the predicted results of your change. First, the percentage change in the density from the baseline:

130

Percent Change

Here are the resulting values:

Source: Mehaffy, M.W. (2014) "Counting Urban Carbon." [citation](#)

18.1

New Emissions per Capita (metric tons)

As we add other patterns, we can explore ways to reduce carbon emissions while making choices based on other criteria.

1,760

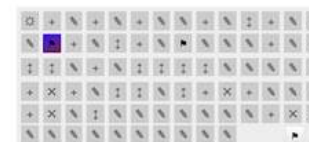
Total Residents (units)

### EXPLORE NEXT PATTERN

Provide for a [Web of Shopping and Activities](#) to create a complete neighborhood, with all the typical activities of daily travel nearby.

Include a [Web of Transportation](#) to provide convenient, well-connected transportation choices.

HINT: You can always go back to previous patterns (including those listed in the "Upward Hyperlinks" section above) and refine your choices. When you are ready to display the final result, click on [Analyze and Display](#).



# Web of Shopping and Activities

Creates a network of destinations serving daily needs and activities.

**Problem:** People need a network of close-by resources that can meet their daily needs, including shopping, recreation, schools, places of work and other daily activities.



*Upward Hyperlinks:* [Density Rings](#), [Web of Transportation](#), [Identifiable Neighborhood](#)

**Discussion:** The web of transportation... etc

**Therefore:** Create a network of destinations serving daily needs and activities, and integrated with the [Web of Transportation](#) and the [Network of Through Streets](#). Provide [Neighborhood Centers](#) at the nodes, which will allow small shops and other activities to form.

## IMPLEMENT THE PATTERN

Score your project's performance on this pattern, with a value from 1 to 10. 5 means "meets the pattern with minimal adequacy." 10 is "meets the pattern to maximum effective degree." 0 is "does not meet the pattern at all." (The default value is 5 -- if you don't know what your score is, leave this value in place.)

8 Web of Shopping and Activities

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8 Web of Shopping and Activities

## CALCULATE THE METRICS

Below are the predicted results of your change.

18.1 New Emissions per Capita  
8 Web of Shopping and Activities  
16.65 Emissions \* (100-Web)/100

16.65

New Emissions per Capita  
(metric tons)

38,099

Total Neighborhood GHG  
Equivalent Emissions  
(metric tons units)

Source: [Mehaffy, MW \(2013\)](#), "Prospects for scenario-modelling urban design methodologies to achieve significant greenhouse gas emissions reductions." citation #

## EXPLORE NEXT PATTERN

Include a [Web of Transportation](#) to provide convenient, well-connected transportation choices.

HINT: You can always go back to previous patterns (including those listed in the "Upward Hyperlinks" section above) and refine your choices. When you are ready to display the final result, click on [Analyze and Display](#).



# Web of Transportation

Creates a network of multi-modal interchanges that provide transportation connectivity.

**Problem:** The system of transportation can only work efficiently if all the parts are well connected.

*Upward Hyperlinks:*  
Identifiable Neighborhood, Density Rings

**Discussion:** The web of transportation... etc



**Therefore:** Create a network of multi-modal interchanges, spaced approx. 1/4 mile (400m) apart. Make larger interchanges further apart (e.g. 1/2 mile, 1 mile etc). At each **interchange**, bring together the modes of transportation, including walking, biking, driving, bus, streetcar, rail and other modes. Assure that a **Network of Through Streets** connects well to the interchanges.

## IMPLEMENT THE PATTERN

Score your project's performance on this pattern, with a value from 1 to 10. 5 means "meets the pattern with minimal adequacy." 10 is "meets the pattern to maximum effective degree." 0 is "does not meet the pattern at all." (The default value is 5 -- if you don't know what your score is, leave this value in place.)

5 Web of Transportation

A rating of 5 corresponds to an average US city (not a

# Web of Transportation

Creates a network of multi-modal interchanges that provide transportation connectivity.

**Problem:** The system of transportation can only work efficiently if all the parts are well connected.



An interchange node in the web of transportation

*Upward Hyperlinks:*  
Identifiable Neighborhood, Density Rings

**Discussion:** The web of transportation... etc

**Therefore:** Create a network of multi-modal interchanges, spaced approx. 1/4 mile (400m) apart. Make larger interchanges further apart (e.g. 1/2 mile, 1 mile etc). At each **interchange**, bring together the modes of transportation, including walking, biking, driving, bus, streetcar, rail and other modes. Assure that a **Network of Through Streets** connects well to the interchanges.

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5 Web of Transportation

A rating of 5 corresponds to an average US city (not a suburb).

## CALCULATE THE METRICS

Below are the predicted results of your change, based on empirical study of neighborhoods with comparable changes.

16.65 New Emissions per Capita  
5 Web of Transportation  
15.82 Emissions \* (100-Web)/100

15.81

New Emissions per Capita  
(metric tons)

36,194

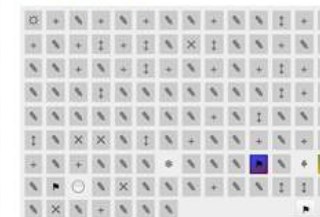
Total Neighborhood GHG  
Equivalent Emissions  
(metric tons units)

Source: Ewing, R., Bartholomew, K., Winkelman, S., Walters, J., & Chen, D. (2009). Growing cooler: the evidence on urban development and climate change. *Renewable Resources Journal*, 25(4), 6-13. citation

## EXPLORE NEXT PATTERN

**HINT:** You can always go back to previous patterns (including those listed in the "Upward Hyperlinks" section above) and refine your choices.

When you are ready to display the final result, click on **Analyze and Display**.



der

**Welcome Visitors**

come to this **Federated Wiki**. From this page you can find where we are and what we do. New users provide this information and claim the site as their own. You will need your own site to participate.

as about us.

ael Mehaffy

as where we do and share.

**PLACE Alpha Test**

Experiment

**PLACE Simple Demonstration**

pattern - Identifiable Neighborhood

can edit your copy of these pages. Press [+/-] to add more content spaces. Read **How to Wiki** for more ideas. Follow **Recent Changes** here and nearby.



BY-SA 4.0 .JSON .localhost:3000

**WikiPLACE Alpha Test**

Welcome to the first alpha version of the WikiPLACE urban design decision support tool.

This page briefly explains the tool. If you're ready to start using the tool, you can skip to the page **Start Tool - Set Baseline**.

WikiPLACE is a simple urban scenario-modeling system with the ease of use of a web-based wiki, combined with the power of numerical calculations. It uses the new 'Federated Wiki' system now in development by wiki inventor Ward Cunningham.

WikiPLACE is able to calculate the predicted change to a given "externality," such as greenhouse gas emissions per person, in response to certain kinds of urban design changes. The changes are represented in the model by "patterns" -- descriptions of urban design features that fit into a network or "language."

As with any language, this "pattern language" is a flexible system that makes it possible to quickly construct different configurations and explore how they perform. The configurations can be easily adapted to specific kinds of problems and contexts. (That's why WikiPLACE is short for "Wiki-based Pattern Language Adaptive Calculator of Externalities.")

This 'alpha test' version uses just five patterns, but in principle this kind of model could grow and evolve to become more complex in response to the particular problems being studied.

The five patterns are updated versions of well-known patterns from the 1977 book *A Pattern Language*. The book was written

**Start Tool - Set Baseline**

First, you will set the baseline metrics for the neighborhood or other area you are designing -- the measurements per capita for "business as usual." Then you can see how variations to the design will affect the predicted outcome.

In this tool, we are modeling changes to CO2 emissions per capita. Enter the baseline CO2 emissions per capita for your residents in the box below, if you have that number. The default below is the average for the USA in 2010. You can look up other countries in the research link given below.

18.1 CO2 Emissions per Capita (Metric Tons)

Source: *US Energy Information Agency, World Per Capita Carbon Dioxide Emissions. report.*

Next, set the size of the neighborhood or area in acres, the baseline number of units, and the average number of residents per unit. You should use average numbers for developments in your area. These can be modified later to see the predicted result for GHG emissions.

80 Neighborhood Increment (Acre)  
10 Dwelling (Units / Acre)  
2.2 Residents / Unit


Now you can start the model and build a scenario to see how it affects the predicted result for GHG emissions.

You can start by setting the essential urban framework patterns from the 1977 book *A Pattern Language*. The book was written

**Identifiable Neighborhood Network**

Establishes the basic neighborhood structure.

**Problem:** People need an identifiable spatial unit to belong to, that provides a framework for meeting their needs within the city. It must have a spatial layout that promotes the ability to walk and to interact with others.



The Neighborhood

**Upward Hyperlinks:** [WikiPLACE Alpha Test](#), [Start Tool - Set Baseline](#)

**Discussion:** There is a growing body of research that shows that walkable neighborhoods have many advantages, including lower greenhouse gas emissions per capita. In particular, there is evidence that a spacing of principal through streets at a rough grid of 1/4 mile (400M) is close to an optimum spacing.

See for example Mehaffy, Porta, Rofe and Salingaros, "Urban nuclei and the geometry of streets: The 'emergent neighborhoods' model" - citation .

**Therefore:** Identify an area that can accommodate the basic complements of neighborhood life: shopping, recreation, homes, workplaces. Place a Network of Through Streets at no more than 1/4 mile within this structure. Provide for retail and commercial Mixed Use along these through streets, especially at intersections.


--- ACTIVATE THE PATTERN ---

Next, apply the pattern to your site

**Density Rings**

Sets the pattern of overall density within a neighborhood, creating zones with greater or lesser density.

**Problem:** Urban density can provide a number of advantages. But people vary in their desire to be close to other people, activities and services, or alternatively, to be in quieter areas with more space. These varied desires require variations of density within a neighborhood, so that people have choices during the day, and over a lifetime.



Variations in neighborhood density offer choices

**Upward Hyperlinks:** [Identifiable Neighborhood Network](#)

**Discussion:** Research shows a strong correlation between increases in density and a number of urban benefits, including the reduction of greenhouse gas emissions per capita. But this factor must be balanced with other factors. citation .

**Therefore:** Set the overall density within the neighborhood. Create ring-like zones with greater or lesser density. Greater density is generally advantageous, but a range should be provided to meet varied needs and preferences.


--- IMPLEMENT THE PATTERN ---

Change the density value below from the baseline. View the results in the 'Metrics' section below that, and adjust as desired.

**Web of Shopping and Activities**

Creates a network of destinations serving daily needs and activities.

**Problem:** People need a network of close-by resources that can meet their daily needs, including shopping, recreation, schools, places of work and other daily activities.



Close-by shopping allows walking and exercise

**Upward Hyperlinks:** [Density Rings](#), [Web of Transportation](#), [Identifiable Neighborhood](#)

**Discussion:** The web of transportation... etc

**Therefore:** Create a network of destinations serving daily needs and activities, and integrated with the **Web of Transportation** and the **Network of Through Streets**. Provide **Neighborhood Centers** at the nodes, which will allow small shops and other activities to form.

--- IMPLEMENT THE PATTERN ---

Score your project's performance on this pattern, with a value from 1 to 10. 5 means "meets the pattern with minimal adequacy." 10 is "meets the pattern to maximum effective degree." 0 is "does not meet the pattern at all." (The default value is 5 -- if you don't know what your score is, leave this value in place.)


Web of Shopping and Activities

--- CALCULATE THE METRICS ---

**Web of Transportation**

Creates a network of multi-modal interchanges that provide transportation connectivity.

**Problem:** The system of transportation can only work efficiently if all the parts are well connected.



An interchange node in the web of transportation

**Upward Hyperlinks:** [Identifiable Neighborhood](#), [Density Rings](#)

**Discussion:** The web of transportation... etc

**Therefore:** Create a network of multi-modal interchanges, spaced approx. 1/4 mile (400m) apart. Make larger interchanges further apart (e.g. 1/2 mile, 1 mile etc). At each interchange, bring together the modes of transportation, including walking, biking, driving, bus, streetcar, rail and other modes. Assume that a **Network of Through Streets** connects well to the interchanges.

--- IMPLEMENT THE PATTERN ---

Score your project's performance on this pattern, with a value from 1 to 10. 5 means "meets the pattern with minimal adequacy." 10 is "meets the pattern to maximum effective degree." 0 is "does not meet the pattern at all." (The default value is 5 -- if you don't know what your score is, leave this value in place.)

Web of Transportation

A rating of 5 corresponds to an average US city (not a suburb).

**Analyze and Display**

Congratulations! You are now ready to see how much reduction you have achieved, according to the WikiPLACE predictive model.

Here is your baseline emissions per capita:

**18.1**  
Original CO2 Emissions Per Capita (metric tons)

--- PREDICTED RESULTS ---

And here is the revised level of emissions per capita, according to the WikiPLACE predictive model:

**15.81**  
Achieved Emissions per Capita (metric tons)

This is a very good result. The model says that, if you were to build this neighborhood as you have specified, you would achieve a reduction from "business as usual" of:

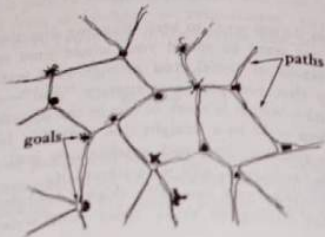
**2.29**  
Achieved Reductions (metric tons)

In the section below you can analyze the network effects and try optimizing the different patterns. Try sliding the fader to vary the value for each of the patterns.

**15.81**

Network Effects 50  
Identifiable Neighborhood Network  
Density Rings  
Web of Shopping and Activities

paths. The paths may be straight, or gently curving between goals; their paving should swell around the goal. The goals should never be more than a few hundred feet apart.



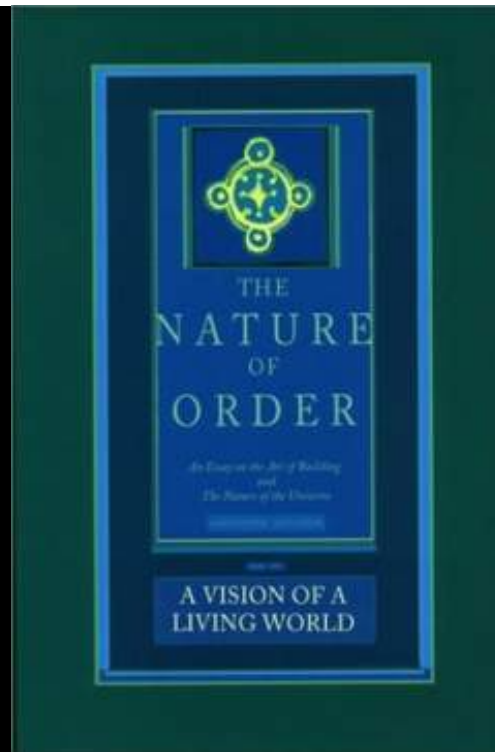
All the ordinary things in the outdoors—trees, fountains, entrances, gateways, seats, statues, a swing, an outdoor room—can be the goals. See FAMILY OF ENTRANCES (102), MAIN ENTRANCE (110), TREE PLACES (171), SEAT SPOTS (241), RAISED FLOWERS (245); build the "goals" according to the rules of SOMETHING ROUGHLY IN THE MIDDLE (126); and shape the paths according to PATH SHAPE (121). To pave the paths use PAVING WITH CRACKS BETWEEN THE STONES (247). . . .

## 121 PATH SHAPE\*



*Key remaining issues with the PL book:*

- *Not enough ability to customize  
(Limits of 253 patterns)*
- *Hard to interface with conventional  
modern systems/methods (e.g. web,  
open source development, etc.)*
- *Not enough information about structure  
(geometric form) to meet designers' needs*

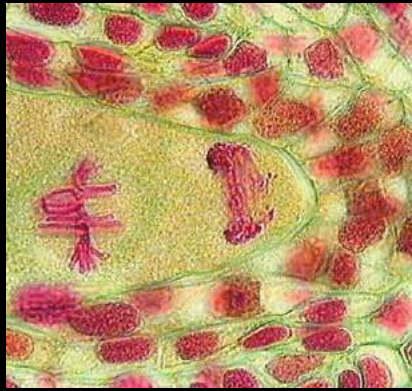


*The Nature of Order:*

*A 25-year project to deal with these shortcomings*

*But how can it be operationalized??*

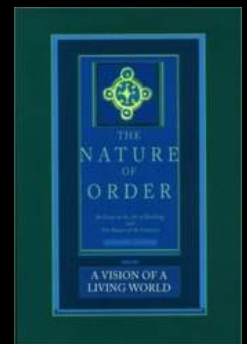


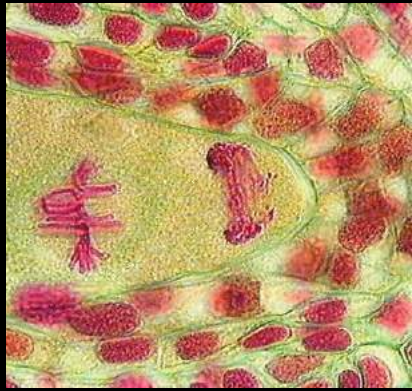


*How does nature achieve the order that we see everywhere around us?*

Nature DOES NOT make “little blueprints”; instead it makes something more like codes or “recipes” for growing form.

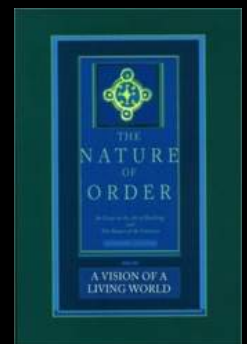
The results are complex, adaptive and “emergent”.

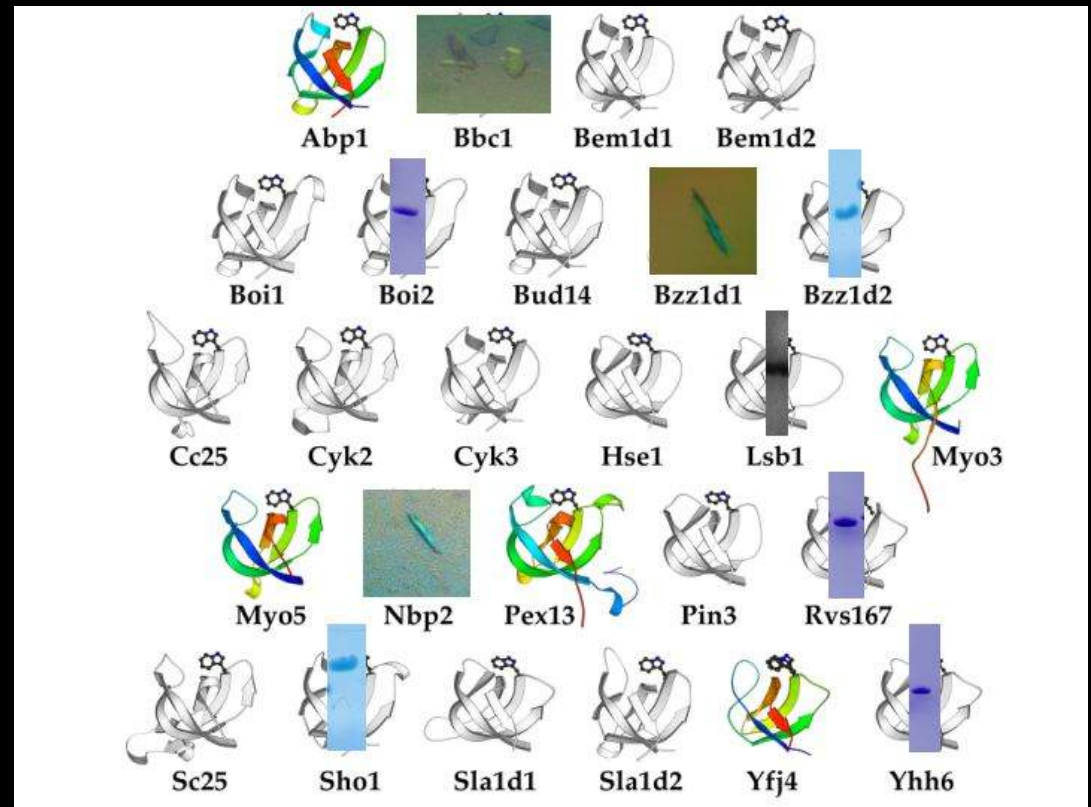
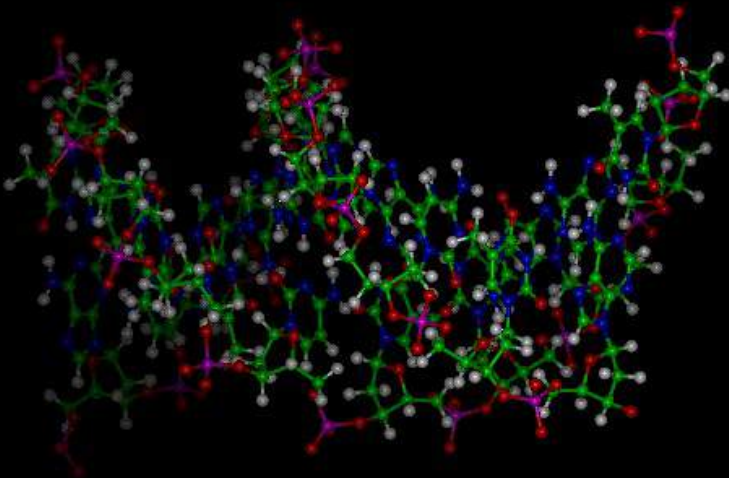


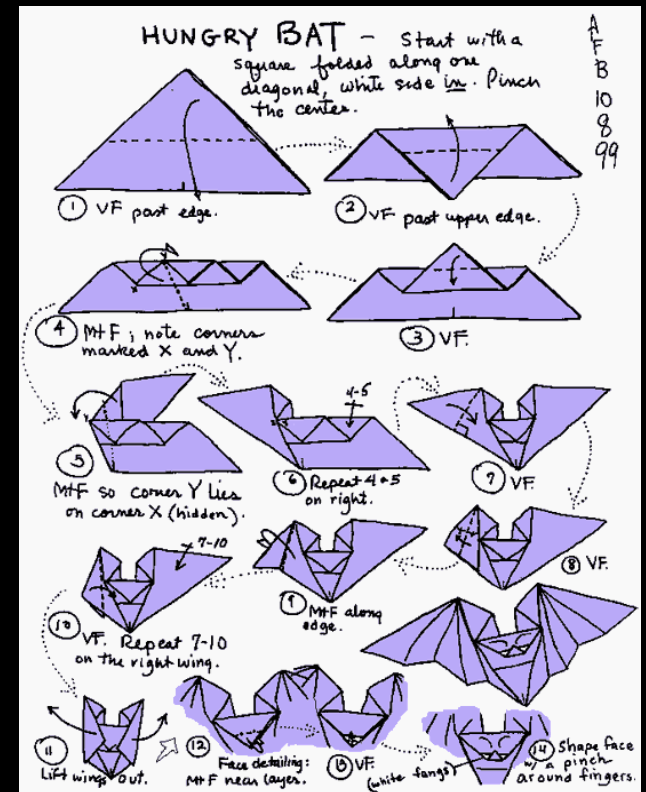
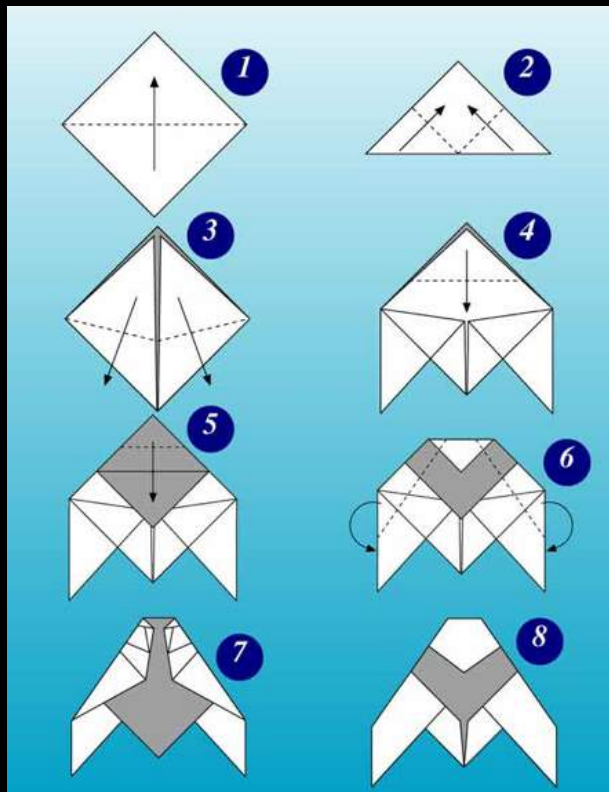
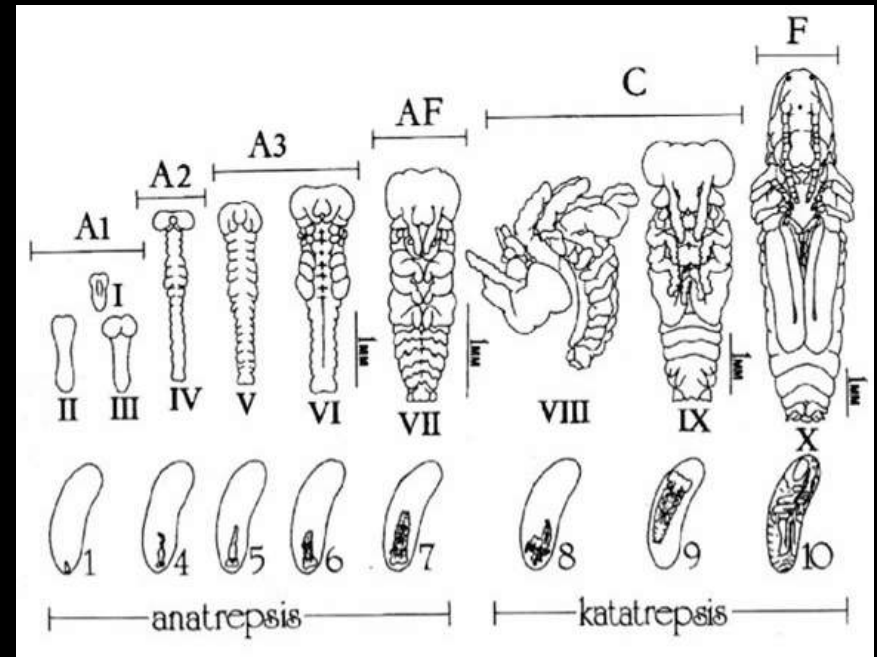
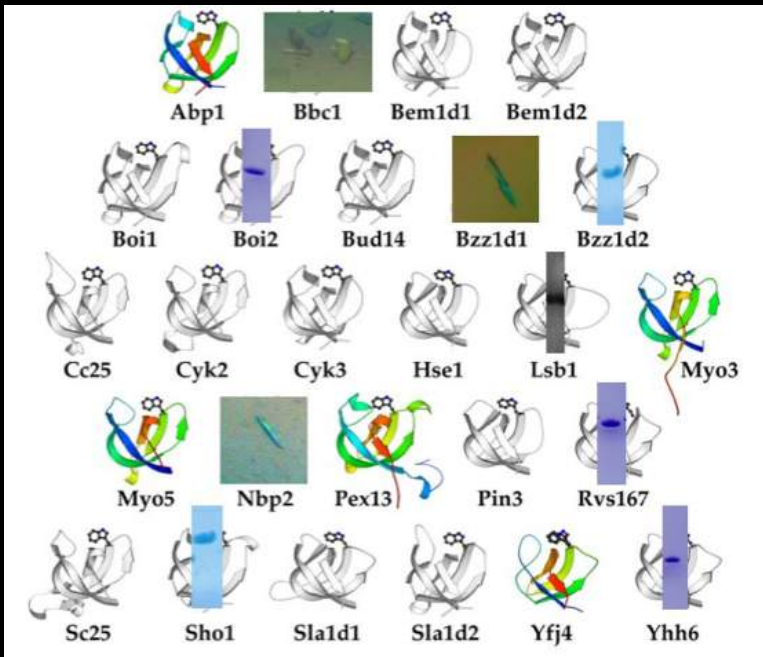


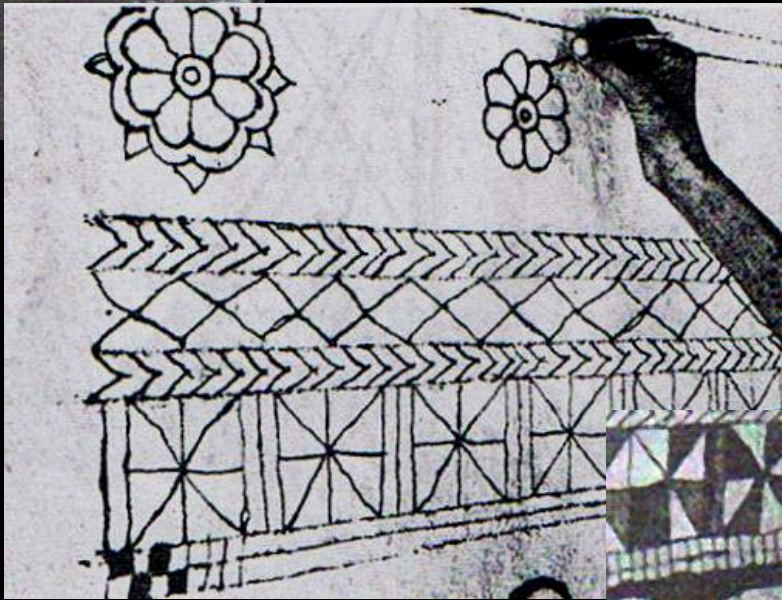
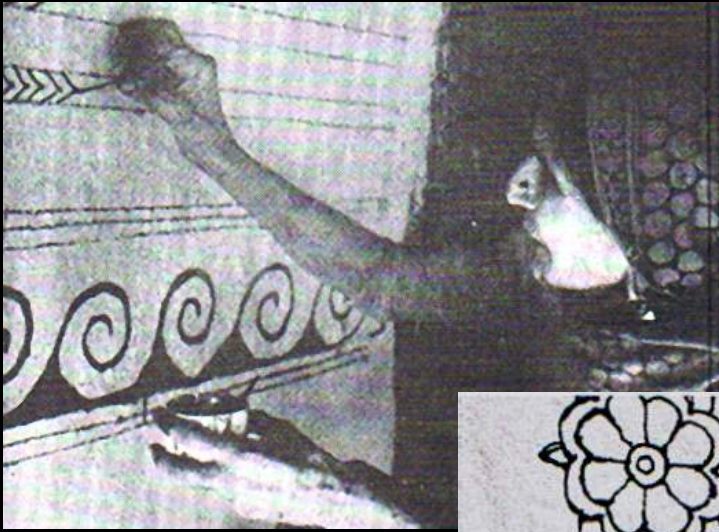
*What are the lessons?*

We CAN learn from these processes, and incorporate them. Indeed, we have done so in the past, and still do so now – but can do much better!

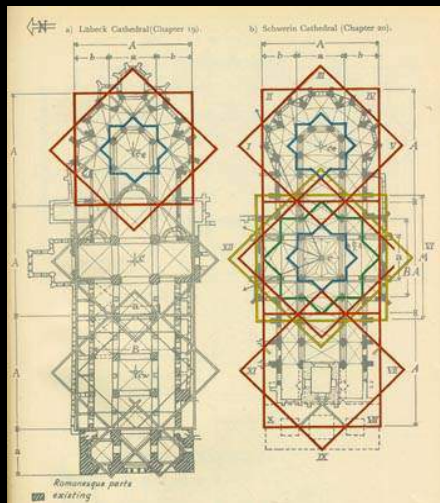
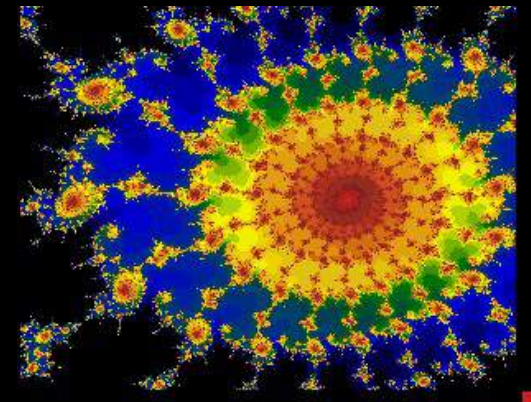
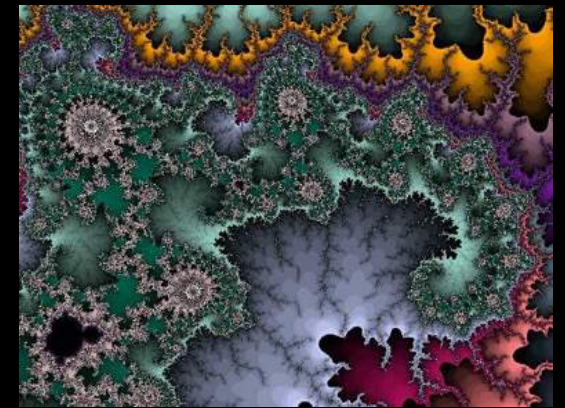
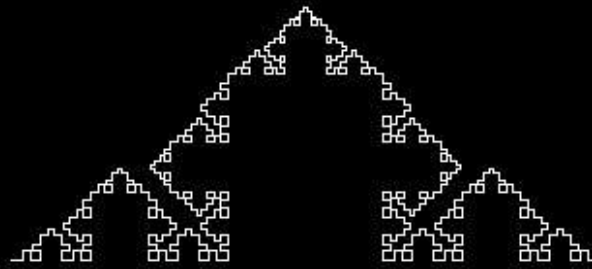
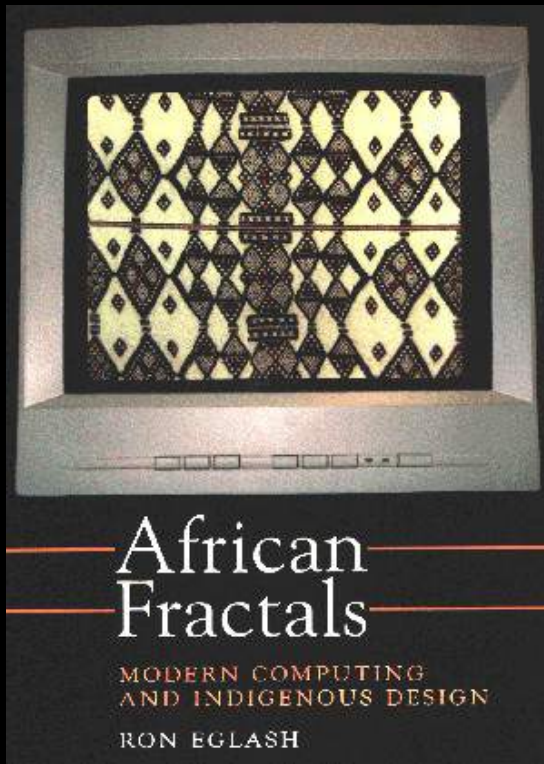




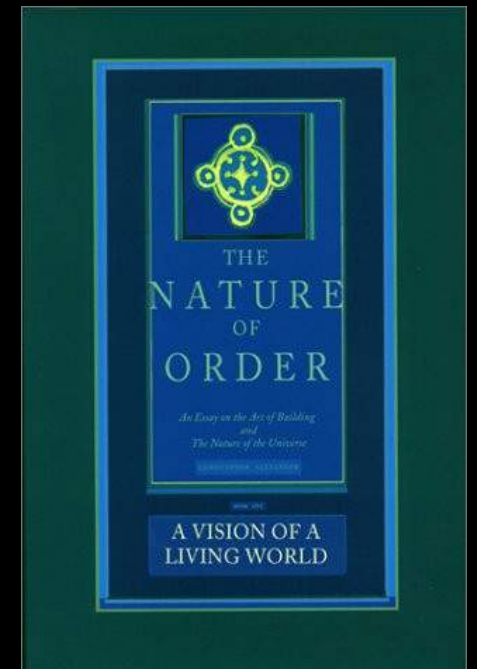






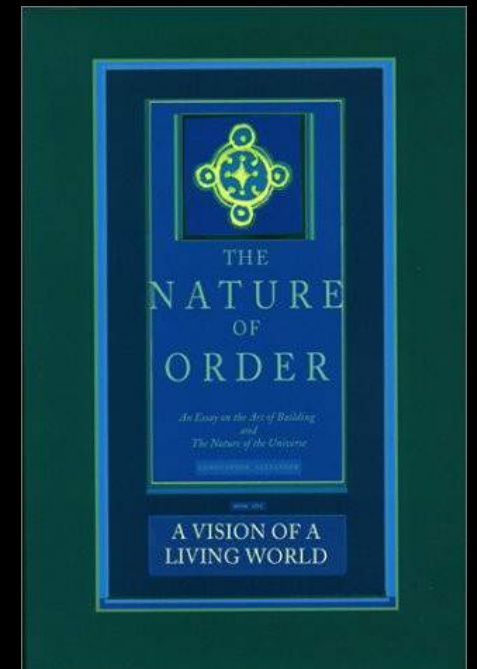


# *Some Key Ideas...*

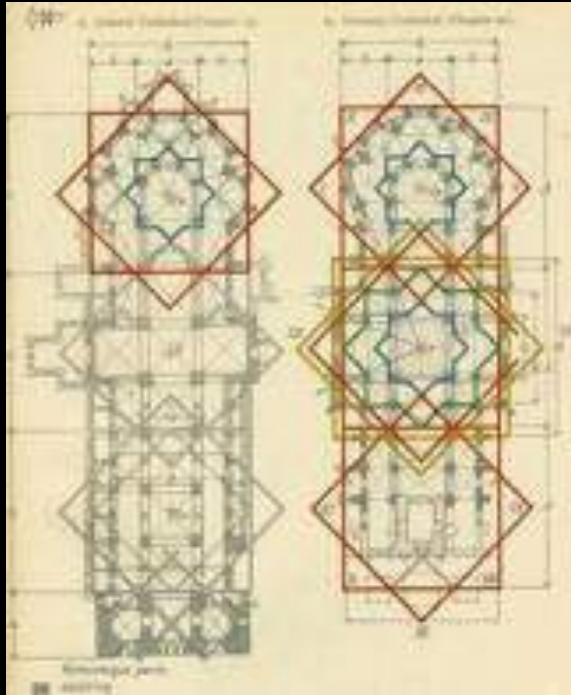




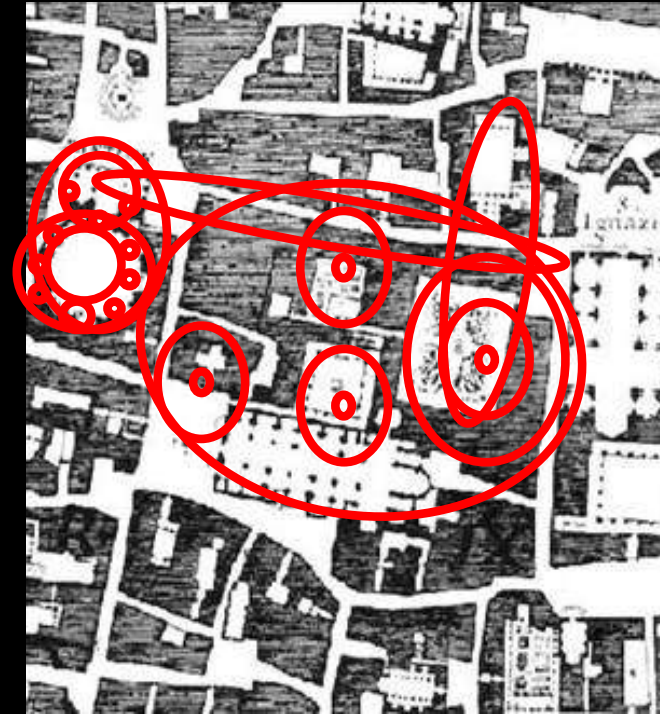
# *Centers*



# *Space Can Be Analyzed as a Field of Centers*



*A relatively simple system of centres – a cathedral plan*



*A much more complex system – the urban fabric of Rome*

## *What are “centers” exactly?*

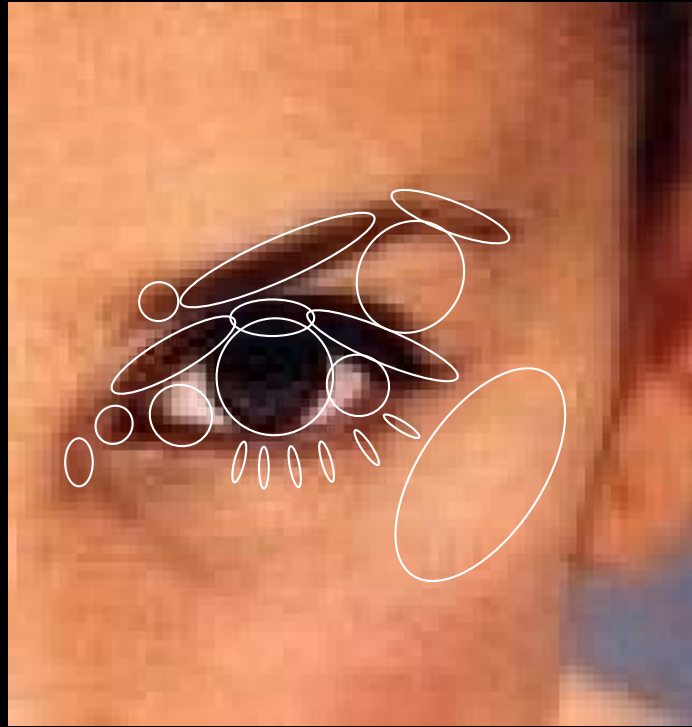
*Centers are particular identified sets, or systems, which appear within the larger whole as distinct and noticeable parts. They appear because they have noticeable distinctness, which makes them separate out from their surroundings and makes them cohere...*

*- Christopher Alexander, The Nature of Order*

*What are “centers” exactly?*

*The life or intensity of one center is increased or decreased according to the position and intensity of other nearby centers. Above all, centers become most intense when the centers which they are made of help each other.*

*- Christopher Alexander, The Nature of Order*







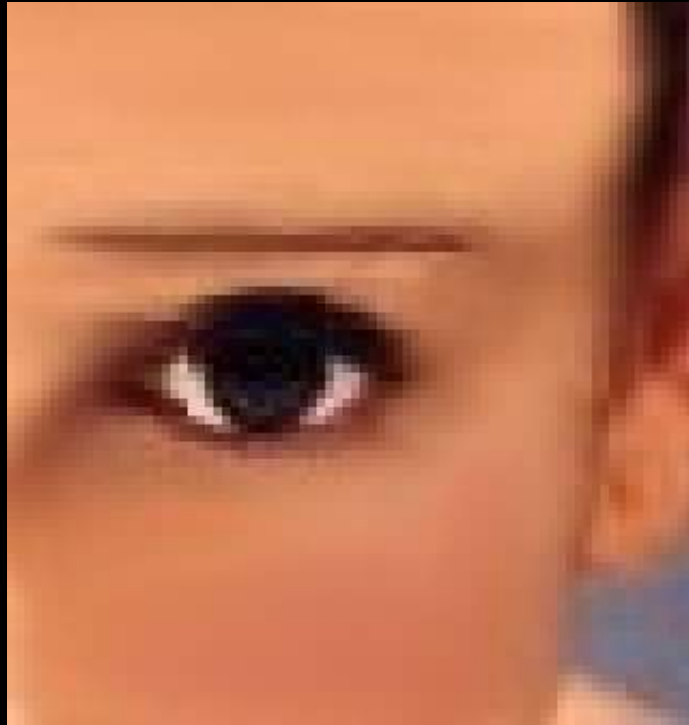


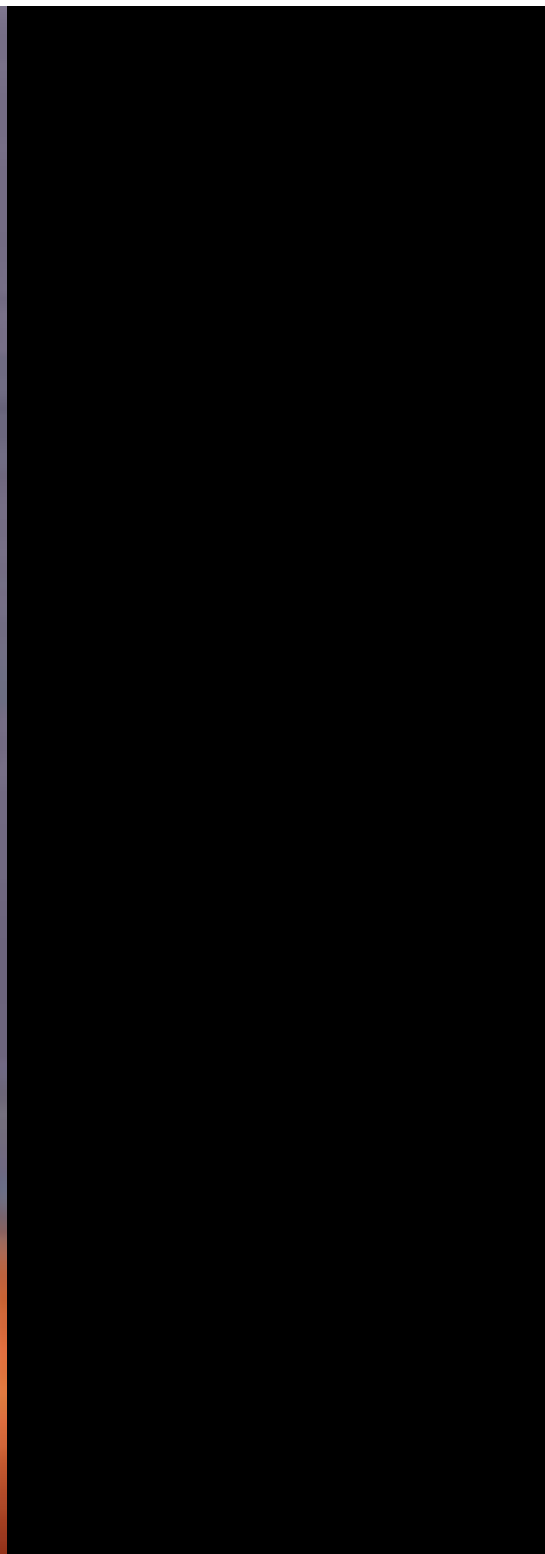
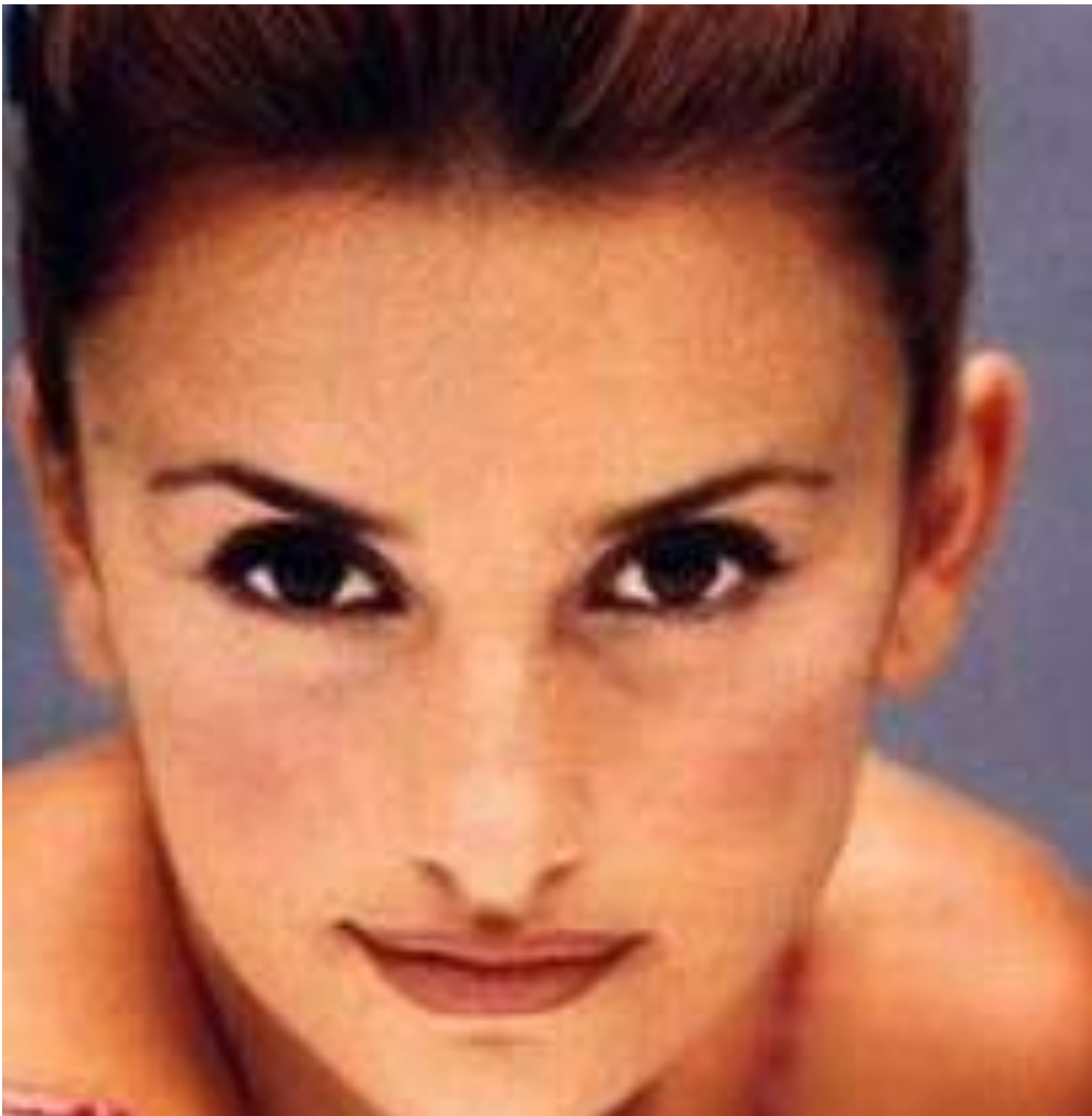




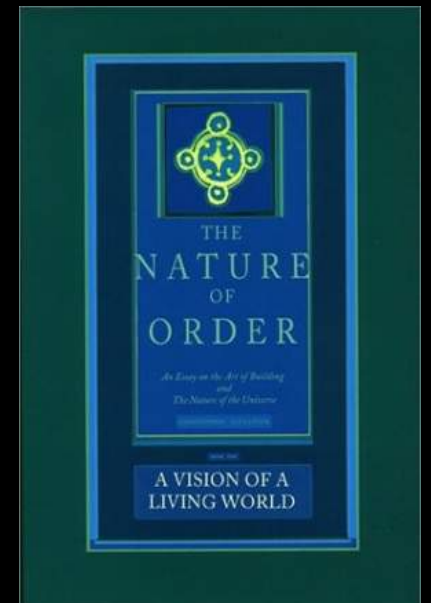




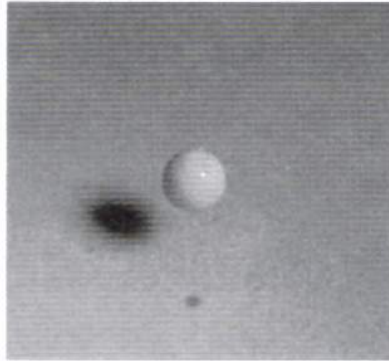




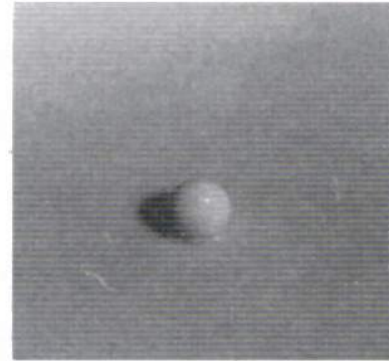
# *Structure-Preserving Transformations*



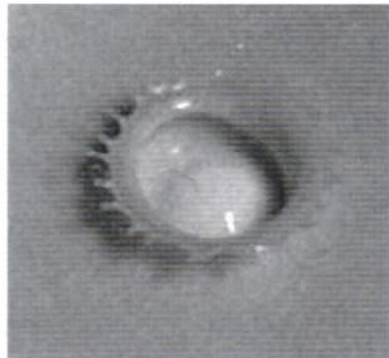
# *Centers go through Structure-Preserving Transformations*



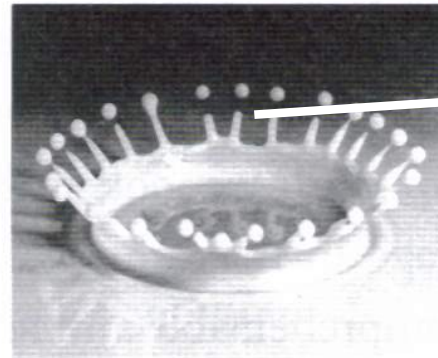
*Stage 1*



*Stage 2*



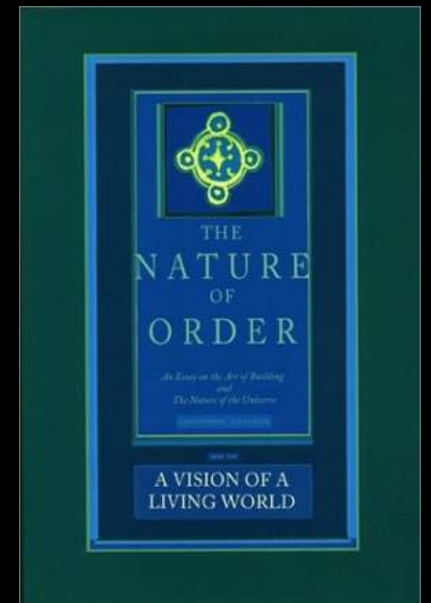
*Stage 3*



*Stage 4*

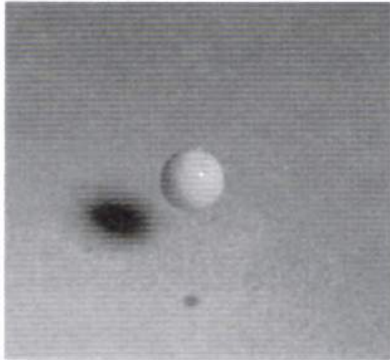
*“Symmetry-breaking”  
creates new symmetries  
and new centers  
with a series of  
geometric properties*

# *15 Geometric Properties*

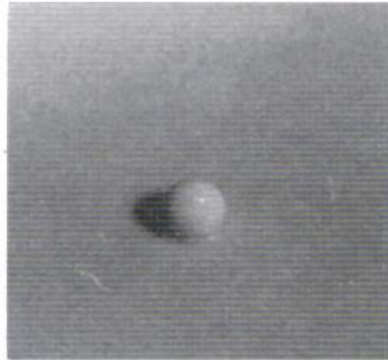




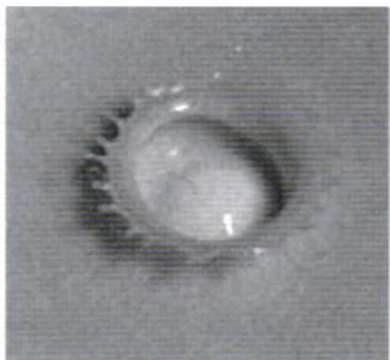
# *Structure-Preserving Transformations create characteristic geometric properties*



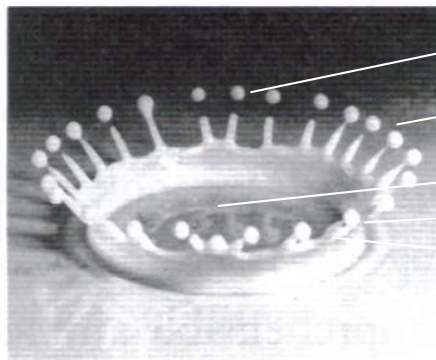
*Stage 1*



*Stage 2*



*Stage 3*



*Stage 4*

*Levels of scale*

*Boundaries*

*Strong centers*

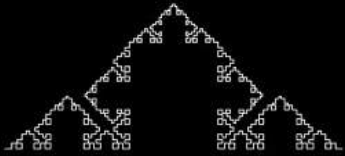
*Local symmetries*

*Alternating repetition*

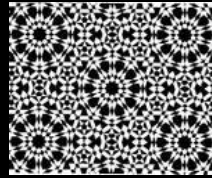
*Etc...*

# 15 Properties of Natural Morphology

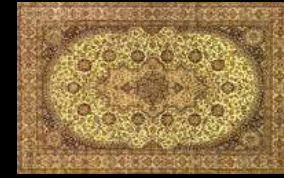
1. Levels of scale



2. Strong centers



3. Boundaries



4. Alternating Repetition



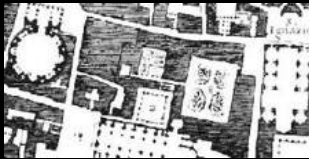
5. Positive Space



6. Good shape



7. Local Symmetries



8. Deep Interlock and Ambiguity



9. Contrast



10. Gradients



11. Roughness



12. Echoes



13. The Void



14. Simplicity and inner calm

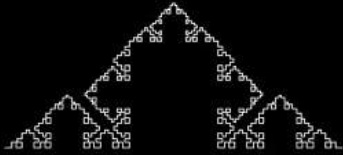


15. Not-separateness

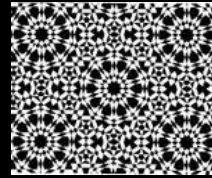


# 15 Properties of Aesthetic Phenomena

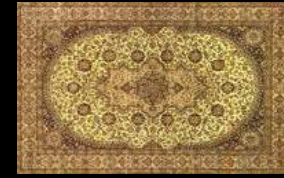
1. Levels of scale



2. Strong centers



3. Boundaries



4. Alternating Repetition



5. Positive Space



6. Good shape



7. Local Symmetries



8. Deep Interlock and Ambiguity



9. Contrast



10. Gradients



11. Roughness



12. Echoes



13. The Void



14. Simplicity and inner calm

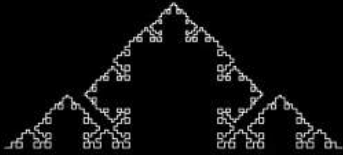


15. Not-separateness

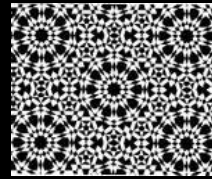


# 15 Transformations of sets-of-centers

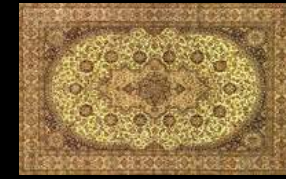
1. Changing levels of scale



2. Strengthening centers



3. Bounding



4. Alternating and Repeating



5. Making Positive Space



6. Transforming Good shape



7. Making local symmetries



8. Deep Interlocking



9. Increasing Contrast



10. Gradating



11. Roughening



12. Echoing



13. Creating The Void



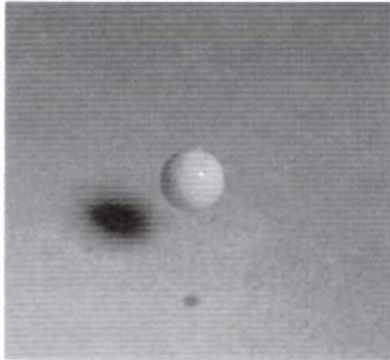
14. Simplifying, calming



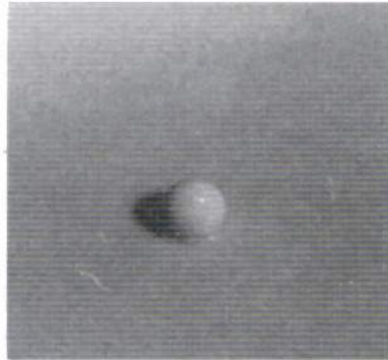
15. Connecting to all



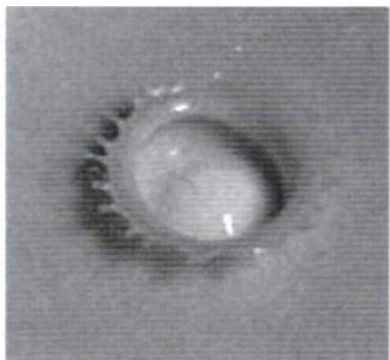
# *Structure-Preserving Transformations create characteristic geometric properties*



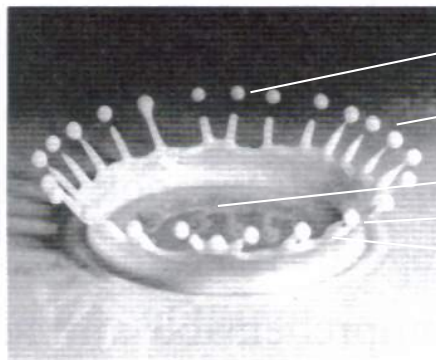
*Stage 1*



*Stage 2*



*Stage 3*



*Stage 4*

*Levels of scale*

*Boundaries*

*Strong centers*

*Local symmetries*

*Alternating repetition*

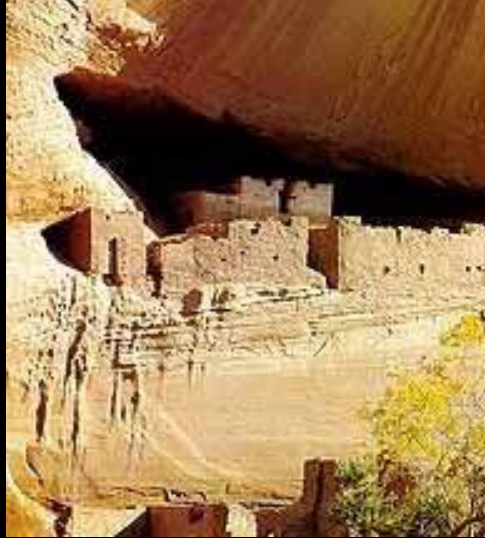
*Etc...*



*Roughness*



*Levels of Scale*



*Local Symmetries*

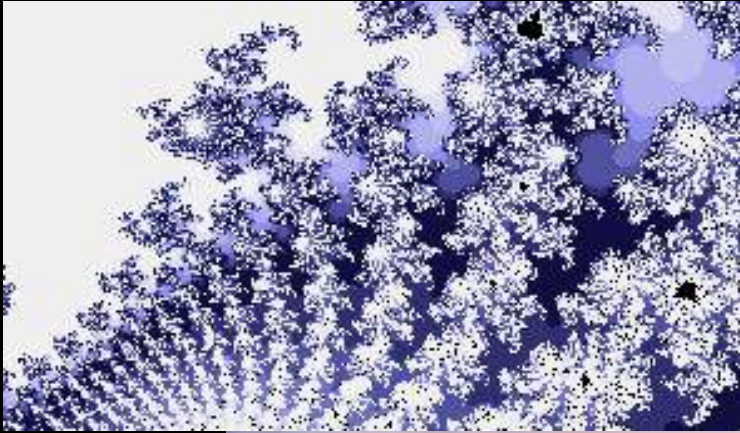
*Strong Centers*



*Alternating  
Repetition*



*Gradients*



*Levels of Scale*

*Echoes*

*Roughness*

*The Void*



*Levels of Scale*



*Strong Centers*



*Boundaries*



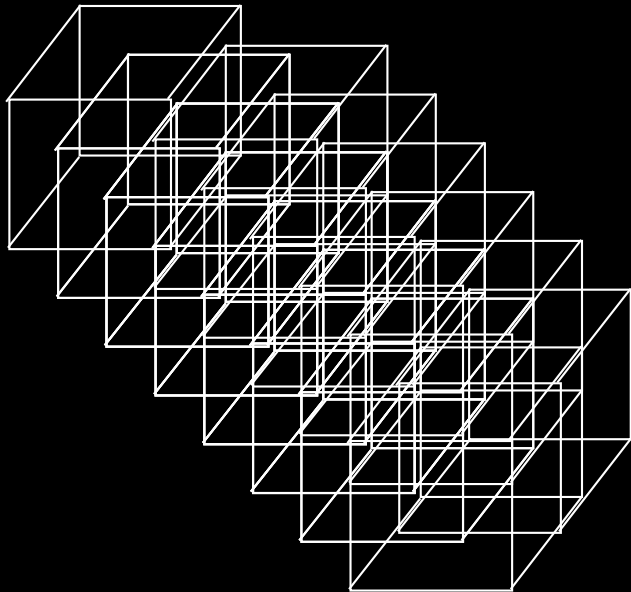
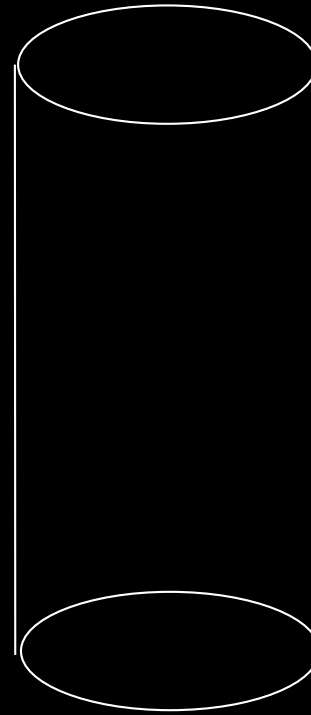
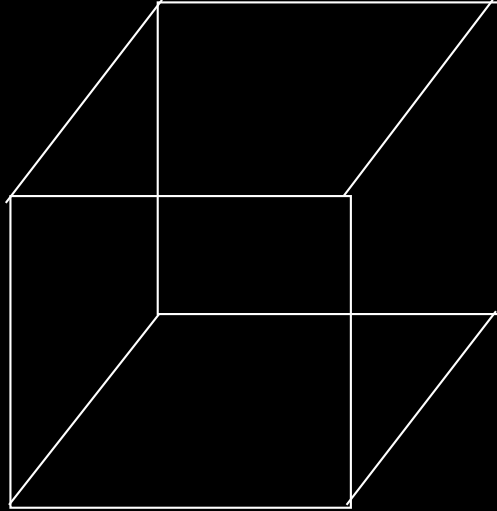
*Alternating Repetition*





*What characteristic geometric properties  
are created by current industrial processes?*

*e.g. stamping, slicing, rotating, aggregating, etc?*



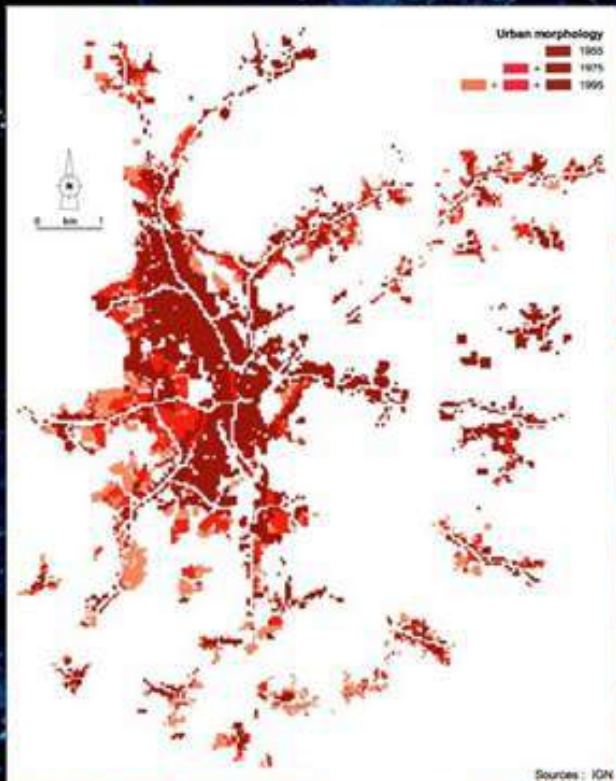
*Much more limited – only a few  
of Alexander's "15 properties"*

# *Template-based mechanical industrialization*



*Economies of scale and standardization – but not  
Economies of PLACE and DIFFERENTIATION*

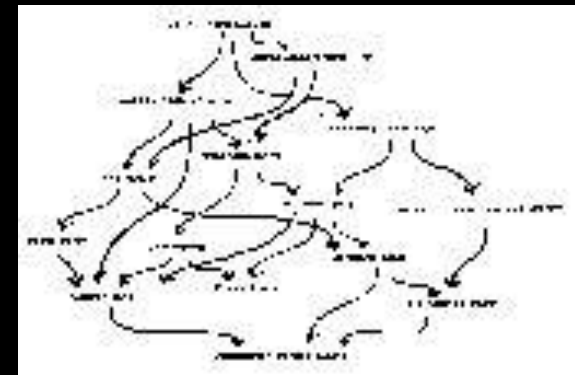
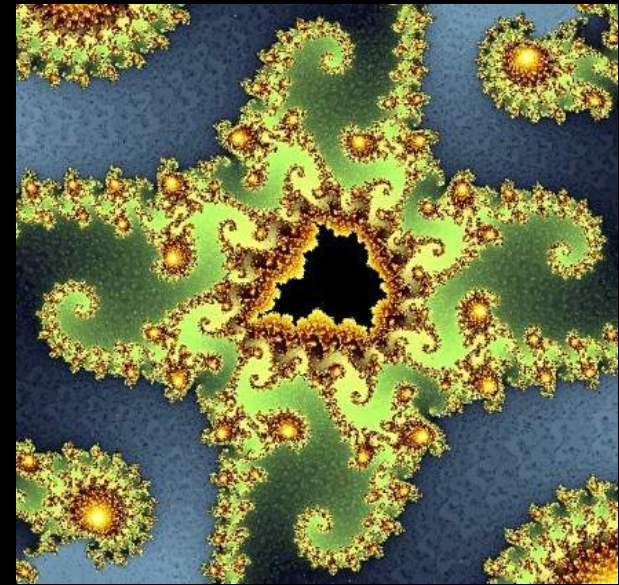
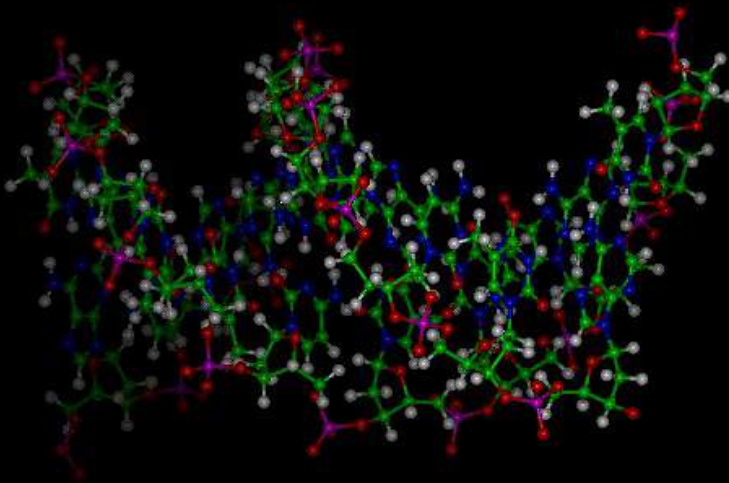
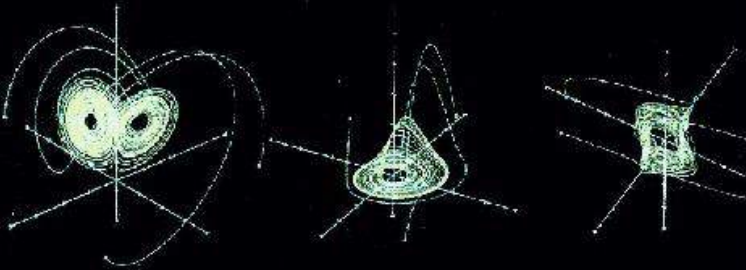
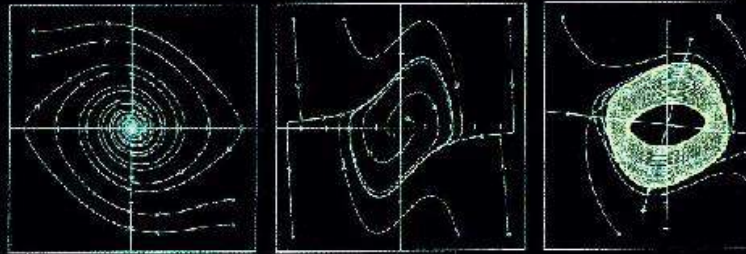
*The kind of problem a city is...*  
*"Organized complexity" (Jane Jacobs)*



*The Return of Time and Scale*

*We (and our cities) are not machines, but biological systems...  
The behavior of such systems is not linear, but can be chaotic*

### Regular vs. Strange attractor



# *Modernity*

*(20<sup>th</sup> Century View)*

- *The Triumph of Reason*

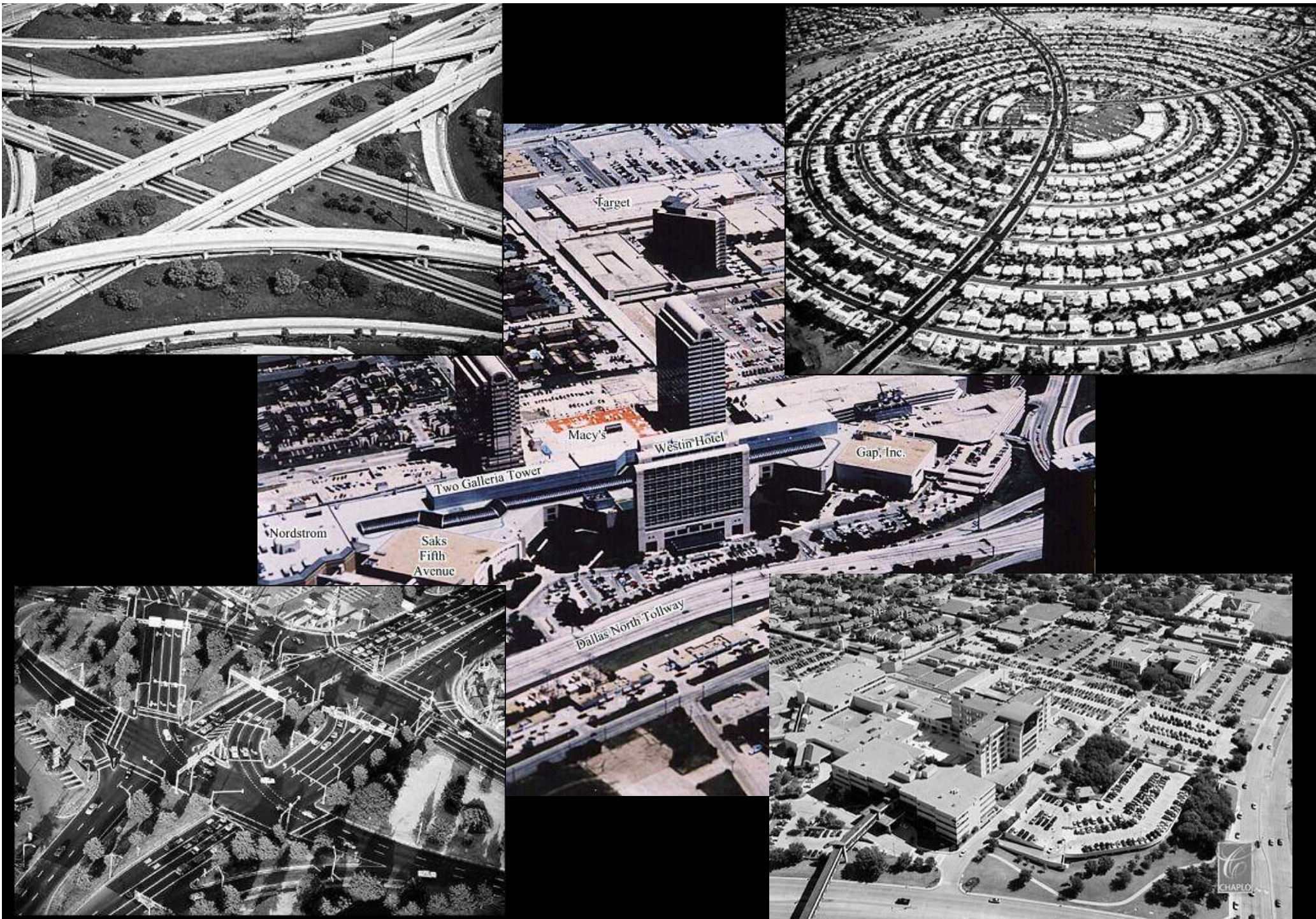
- *Political Enlightenment*



- *Technology as Salvation*

- *Romance of the New*

- *Mechanical Technology as Ordering Idea (Image, Fashion)*



*“Rational” plans often result in irrational “unanticipated consequences”!*

THE DEATH  
AND LIFE  
OF GREAT  
AMERICAN  
CITIES

JANE JACOBS

***Jane Jacobs***



The Death and Life of Great American Cities:  
*The Kind of Problem a City Is*

Jane Jacobs, 1961

“Why have cities not, long since, been identified, understood and treated as problems of organized complexity?”

The Death and Life of Great American Cities:  
*The Kind of Problem a City Is*

Jane Jacobs

The history of modern thought about cities is unfortunately very different from the history of modern thought about the life sciences. The theorists of conventional modern city planning have consistently mistaken cities as problems of simplicity and of disorganized complexity, and have tried to analyze and treat them thus.

The Death and Life of Great American Cities:  
*The Kind of Problem a City Is*

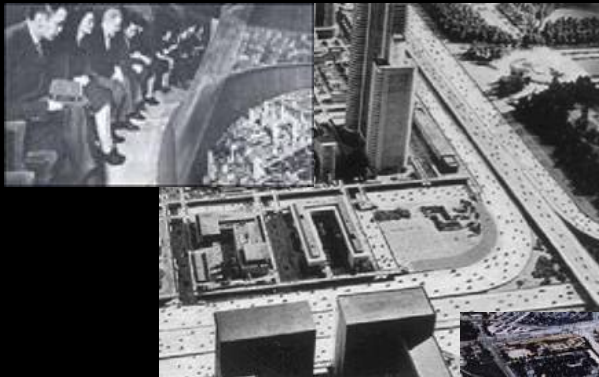
Jane Jacobs

Today's plans show little if any perceptible progress in comparison with plans devised a generation ago. In transportation, either regional or local, nothing is offered which was not already offered and popularized in 1938 in the General Motors diorama at the New York World's Fair, and before that by Le Corbusier. In some respects, there is outright retrogression....

# The Death and Life of Great American Cities: *The Kind of Problem a City Is*

Jane Jacobs

In some respects, there is outright retrogression....



1938



2000



1923



2004

*The CIAM Model of 1933  
(as defined in "The Athens Charter")*

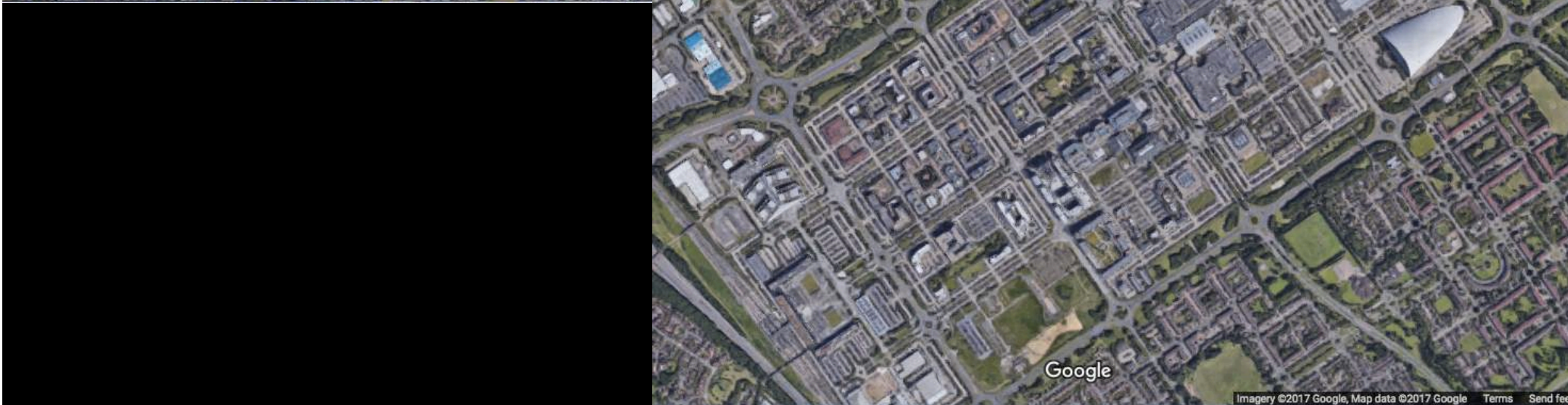
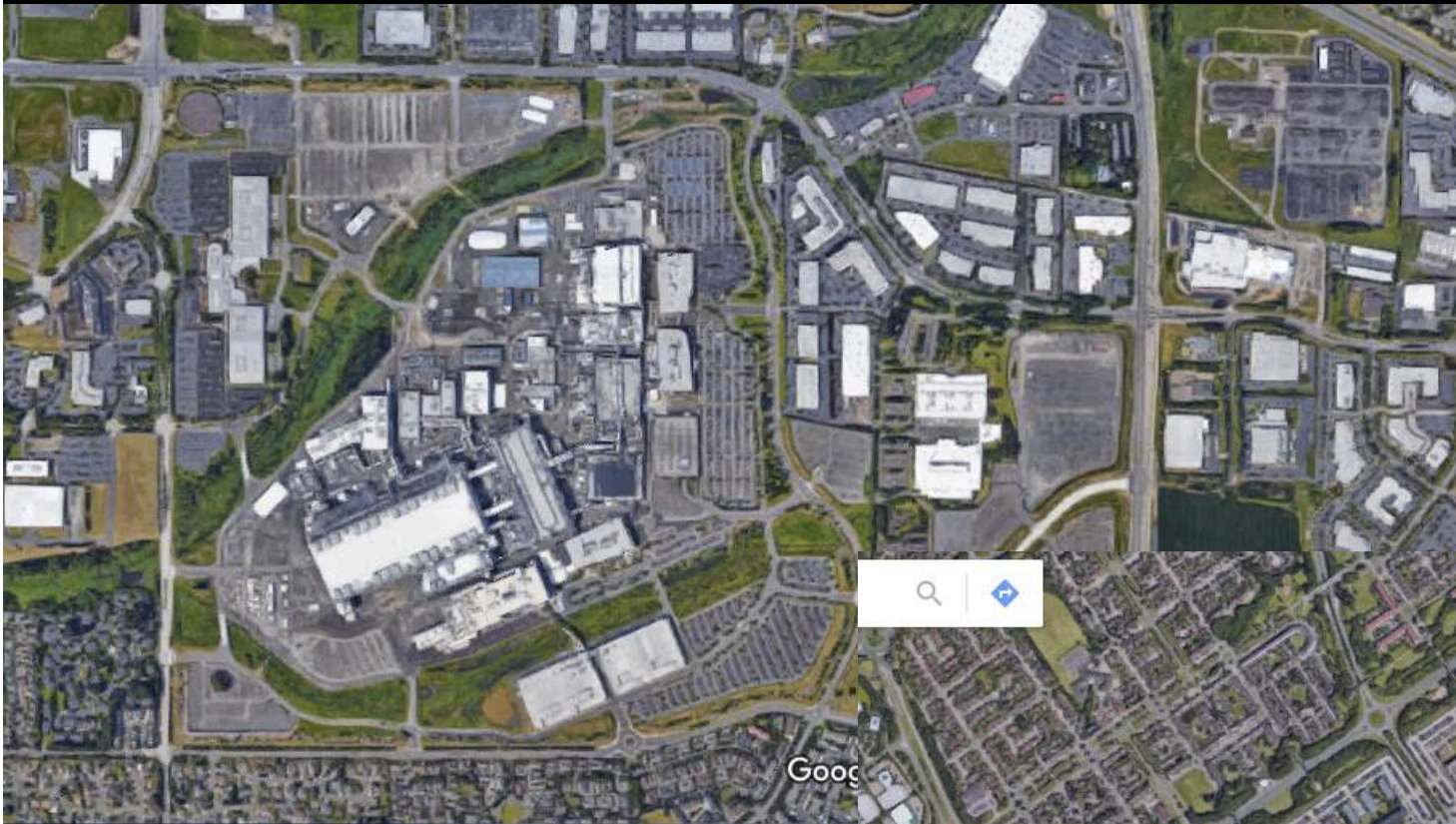


*L'ordre.... Le désordre....*

# *Modernist Victor Gruen's Shopping Mall Invention*



# *Supercampuses and Superblocks*



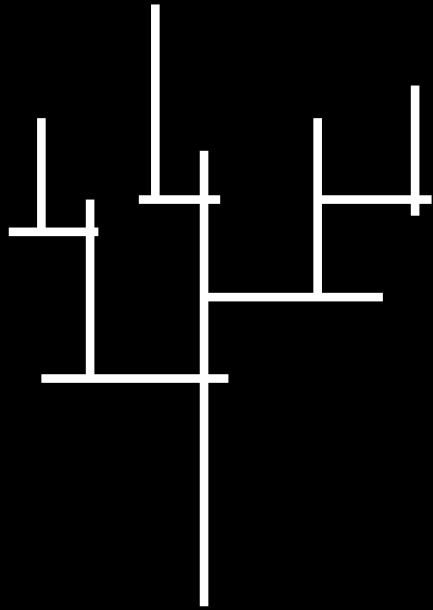
# *“Dendritic” Street Patterns*



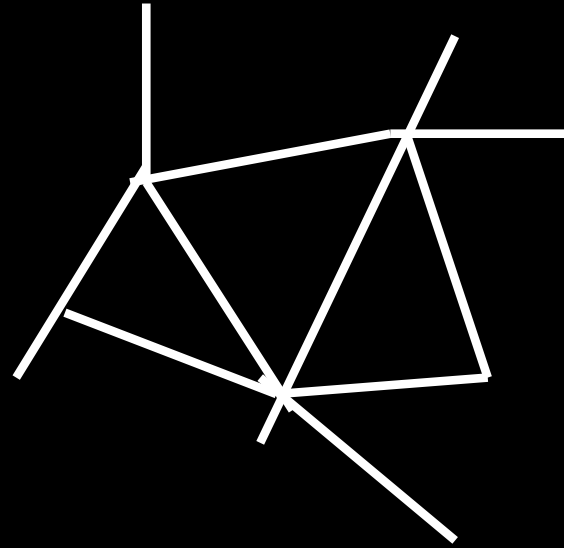
copyright Fritz Mueller



# *Connective Relationships*

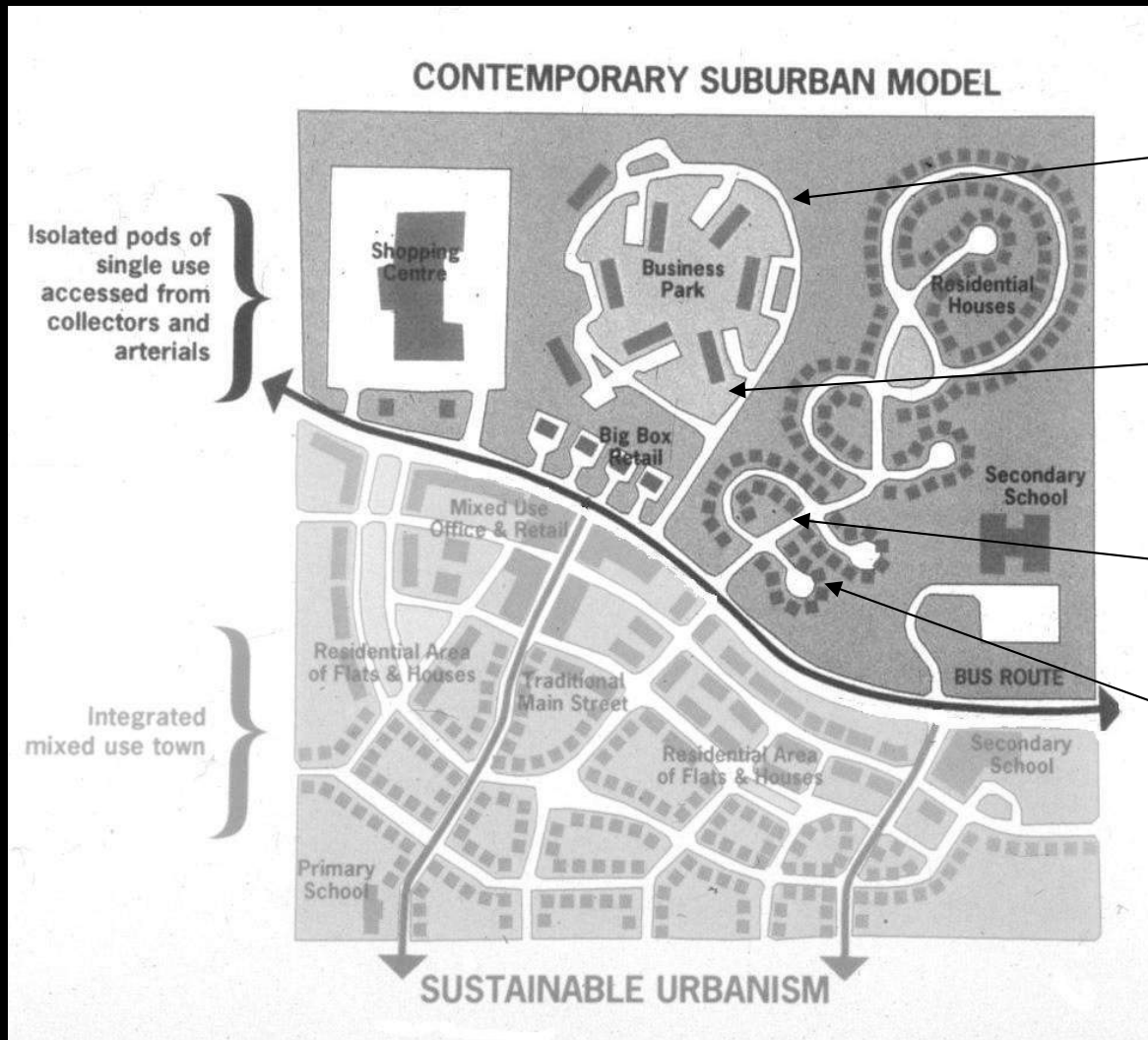


*Hierarchy*  
*("Tree")*



*Web-Network*  
*("Semi-Lattice")*

# *A Hierarchical Neighborhood*



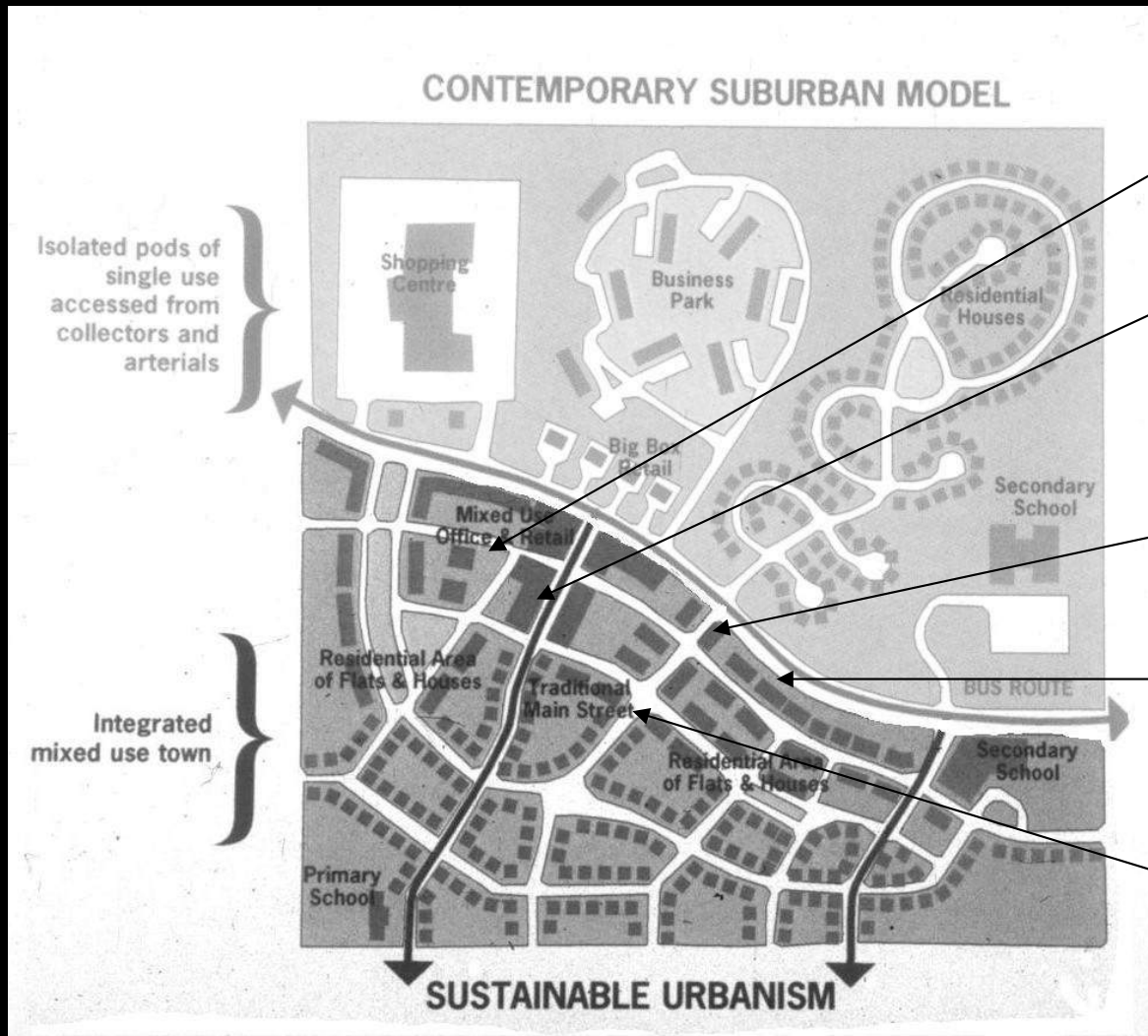
*Hierarchy requires extensive driving, even for simple trips*

*Not walkable, poor public realm*

*Public transit not practical*

*Sprawling, land-inefficient*

# *A Web-Networked Neighborhood*



*Network means shorter trips*

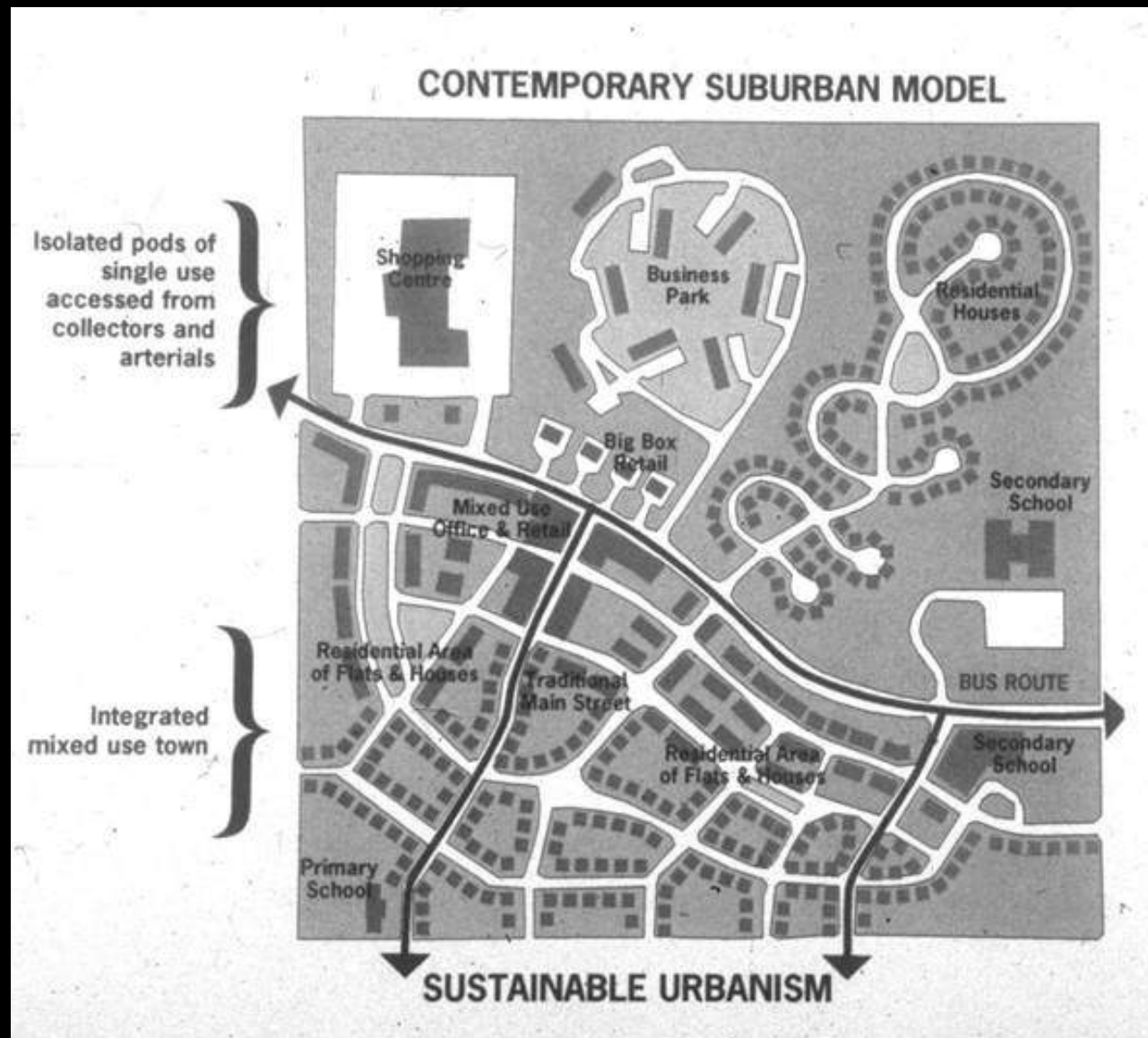
*Walkability promotes physical health and civic interaction*

*Public transit more feasible*

*Livable at higher densities = greater land efficiency*

*Evidence shows strong public realm aids in formation of social capital*

# *The Same Ingredients!*



*But far fewer of them in the “hierarchical neighborhood” ...*

*...than in the same area of an efficient networked neighborhood*

# *The Same Ingredients!*

A Functional **ZONE**  
admits  
one single quality (function) of a City  
at the exclusion of all others

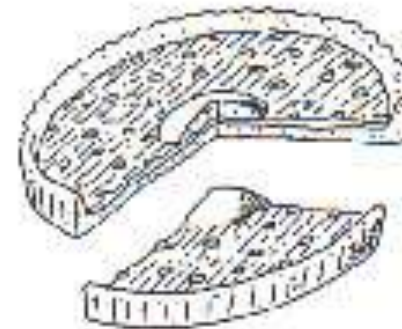
**EXCLUSIVE**



All that is not specifically obligatory  
is strictly forbidden

An Urban **QUARTER**  
CONTAINS and **PROMOTES**  
all the Qualities of a  
**CITY**

**IN-CLUSIVE**



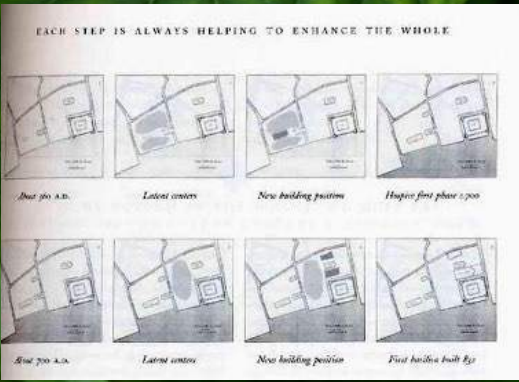
All is Permitted & Promoted  
that is not strictly forbidden



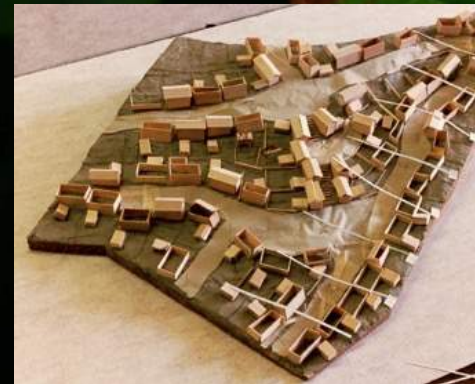
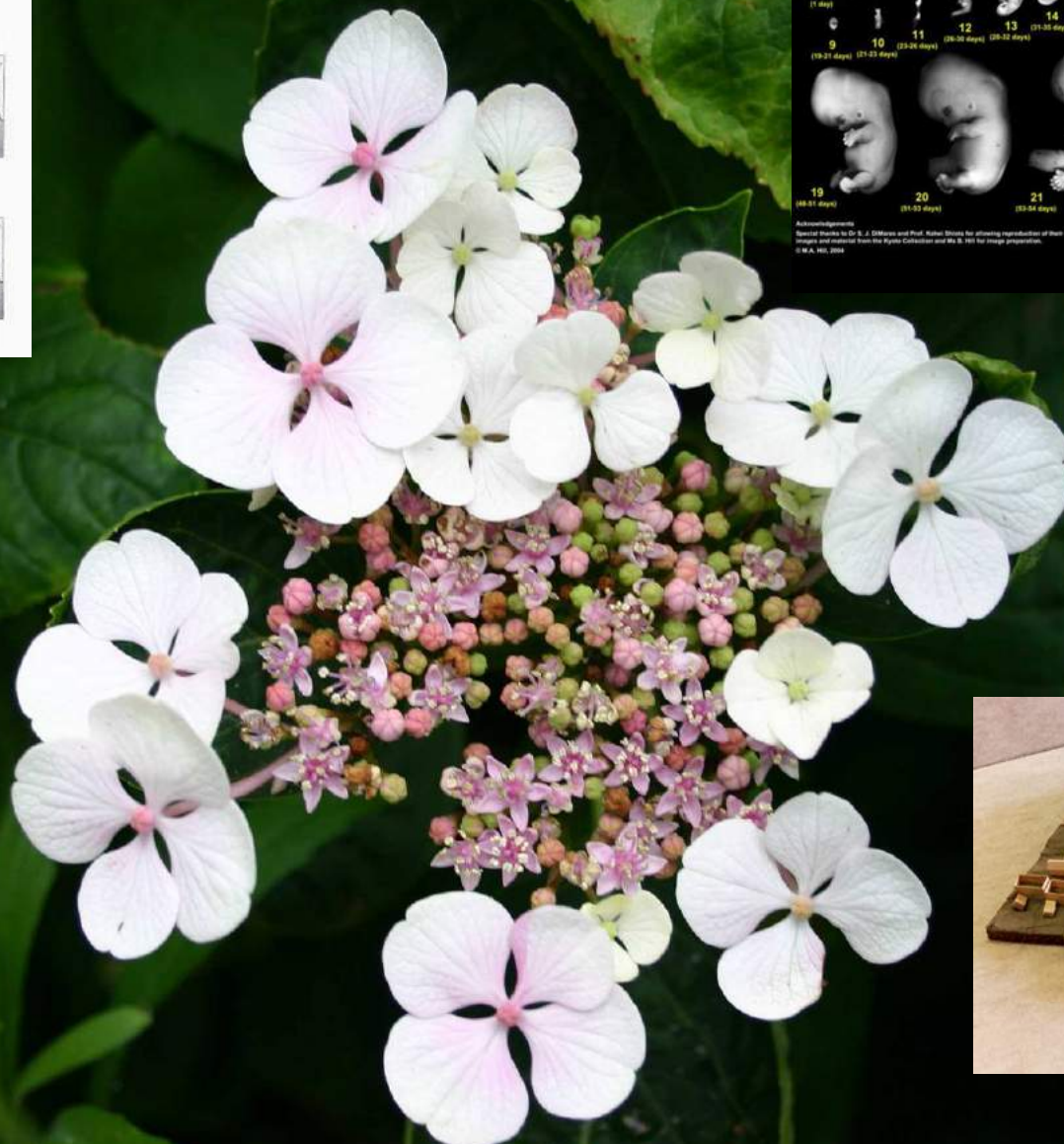
*The New Urban Agenda recognizes that cities are complex networks that need connectivity, diversity, and the capacity for adaptive evolution...*

*(Guided by smart frameworks!)*

# As in biological processes of adaptation and differentiation...



## Carnegie Stages of Human Development



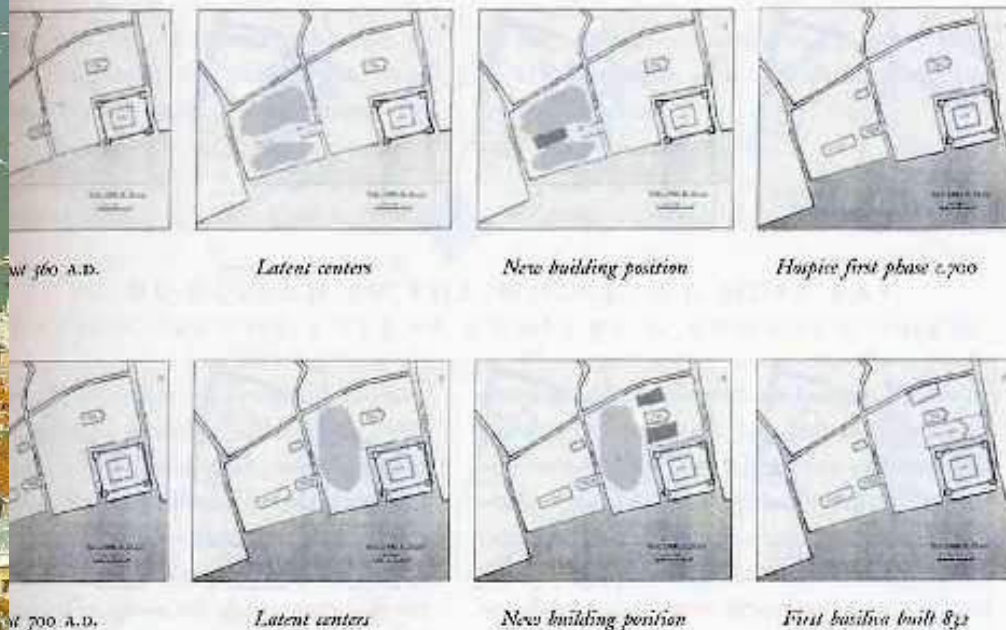
# Differentiated growth following life-like rules and processes...



- *Step-wise adaptation*
- *Feedback signals*
- *Qualitative evaluation*
- *Iterative cycles*
- *Community action*
- *Etc...*



EACH STEP IS ALWAYS HELPING TO ENHANCE THE WHOLE





***BEYOND over-standardized, over-abstracted,  
poor-adaptivity rules and processes...***



- Segregated use zoning
- Remote design processes
- Bank lending rules
- Traffic engineering
- Market dynamics
- Etc...





## **Bottom-up AND top-down:**

*A problem “more like gardening than carpentry”*

- *Evaluating, building fertile soil*
- *Planting the right seeds*
- *Watering and fertilizing*
- *Pruning/weeding*
- *Building trellises*



## **Bottom-up AND top-down:**

*A problem “more like gardening than carpentry”*

- *Evaluating, building fertile soil*
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- *Building trellises*

*...(Diagnosing/improving)*

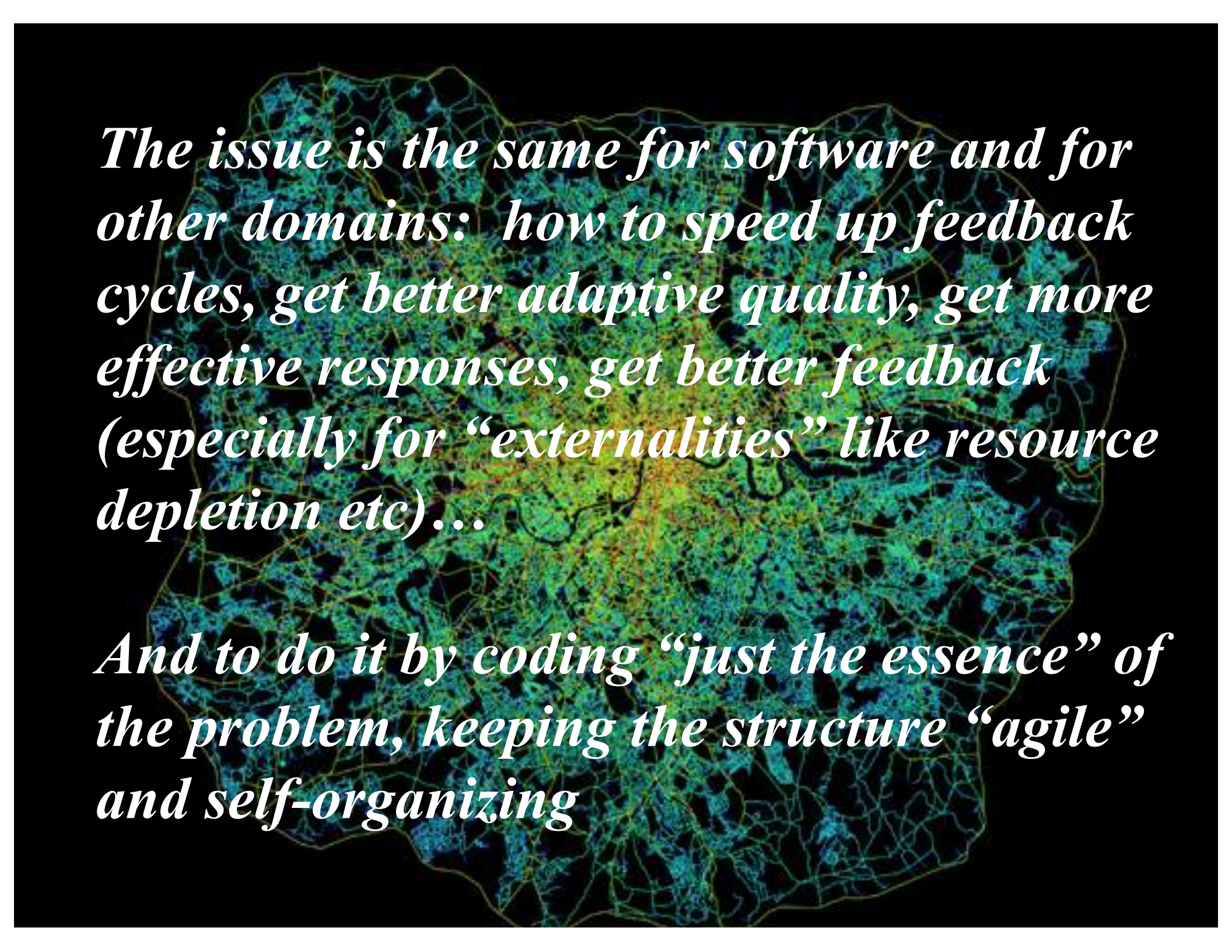
*...(Patterns, prototypes)*

*...(Incentives, funding)*

*...(Regulations)*

*...(Infrastructure, frameworks)*

- **And combining all of the above, into strategic toolkits –  
changing the “operating system for growth!”**



*The issue is the same for software and for other domains: how to speed up feedback cycles, get better adaptive quality, get more effective responses, get better feedback (especially for “externalities” like resource depletion etc)...*

*And to do it by coding “just the essence” of the problem, keeping the structure “agile” and self-organizing*

A complex, fractal-like network structure, possibly representing a biological or social network, is shown against a black background. The network consists of numerous interconnected nodes and edges, forming a dense, branching pattern. The color of the network transitions from a deep blue at the periphery to a bright yellow in the center, suggesting a gradient of activity or density. The overall shape is irregular and roughly circular.

*The question really comes down to this: how do you generate rather than specify?*

*– Ward Cunningham*

*Thank you!*