1 System design

Cellular automata

Continuous

Discrete
1 dimensional 2 dimensional

Turing machines

s_r

C C C V A R R C C C

L-Systems

(...)

2 System control

Controllable
Parameters
(genotype)

System properties
(phenotype)

G

x'

x

P

p

p'

B

b

$\mathcal{G}$ b'

Behavior

Challenges

3 Open-ended evolution

Bacteria   Archaea

Eukaryota

Spirochetes   Chloroflexi   Entamoebae   Slime   Animals
                                                    molds   Fungi
            Gram-   Methanosarcina
            positives   Methanobacterium   Haloarchaea   Plants
Proteobacteria   Methanococcus   Ciliates
Cyanobacteria   Thermococcus
                    celer   Flagellates
Planctomyces   Thermoproteus
                    Pyrodicticum   Trichomonads
Bacteroides
Cytophaga   Microsporidia
Thermotoga
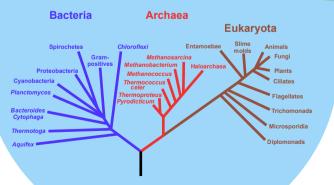   Diplomonads
Aquifex

4 Communi-cate with the system

How to send inputs?

Complex
system

Read back outputs?