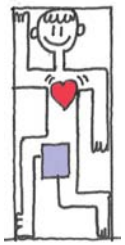
INTELLIGENCE OF INTELLIGENT BUILDINGS

MEZINÁRODNÍ KONFERENCE 11.10. 2011
PRAHA– KC CITY TOWER PANKRAC



MICHAL POSTRANECKY, ARCHITECT

PH TOWERS LAS VEGAS

INTELLIGENCE OF INTELLIGENT BUILDINGS

Inteligence (Intelligence) je pojem patřící mezi základní psychologické kategorie. Je definována jako *„obecná schopnost jedince vědomě zaměřit své myšlení na nové požadavky, je obecnou duševní schopností adaptace na nové úkoly a podmínky života“* (William Stern, 1912).

INTELLIGENCE

INTELIGENCE

One approach is to define intelligence in terms of its constituent processes: a process of Learning, Reasoning, and the Ability to manipulate symbols (Symbol Reasoning).

Ray Kurzweil, Intelligent Machines

INTELIGENCE …

Learning

Data (Databáze), Fakta, Vztahy mezi fakty

Reasoning

(myšlení v logické, rozumově podobě)

Schopnost vytvářet závěry a vztahů na zakladě dosažené znalosti k dosažení konkrétních cílů nebo vyřešení specifických problémů (již také s užitím "fuzzy logic" nejistých či neuplných poznatků na zakladě matematických modelů)

Symbolic Reasoning

Schopnost učit se a získávat znalosti a používat je deduktivně a v komplexní podobě jako symboly. Symboly jsou zde míněny jako stuktury a sítě faktů a ostatních symbolů. Symboly jsou organizovány ve složitých patternech. Mozek je schopen poté tyto patterny rozeznat v podobě symbolů a to v kontextu jiném, než je poznal.

SINGULARITY (IS NEAR) AND BEYOND…

***Artificial Machines**… If we can replace the word "**artificial**" with "**machine**" the problem of defining artificial intelligence become a matter of defining intelligence.*

"Intelligent Machines", Raymond Kurzweil

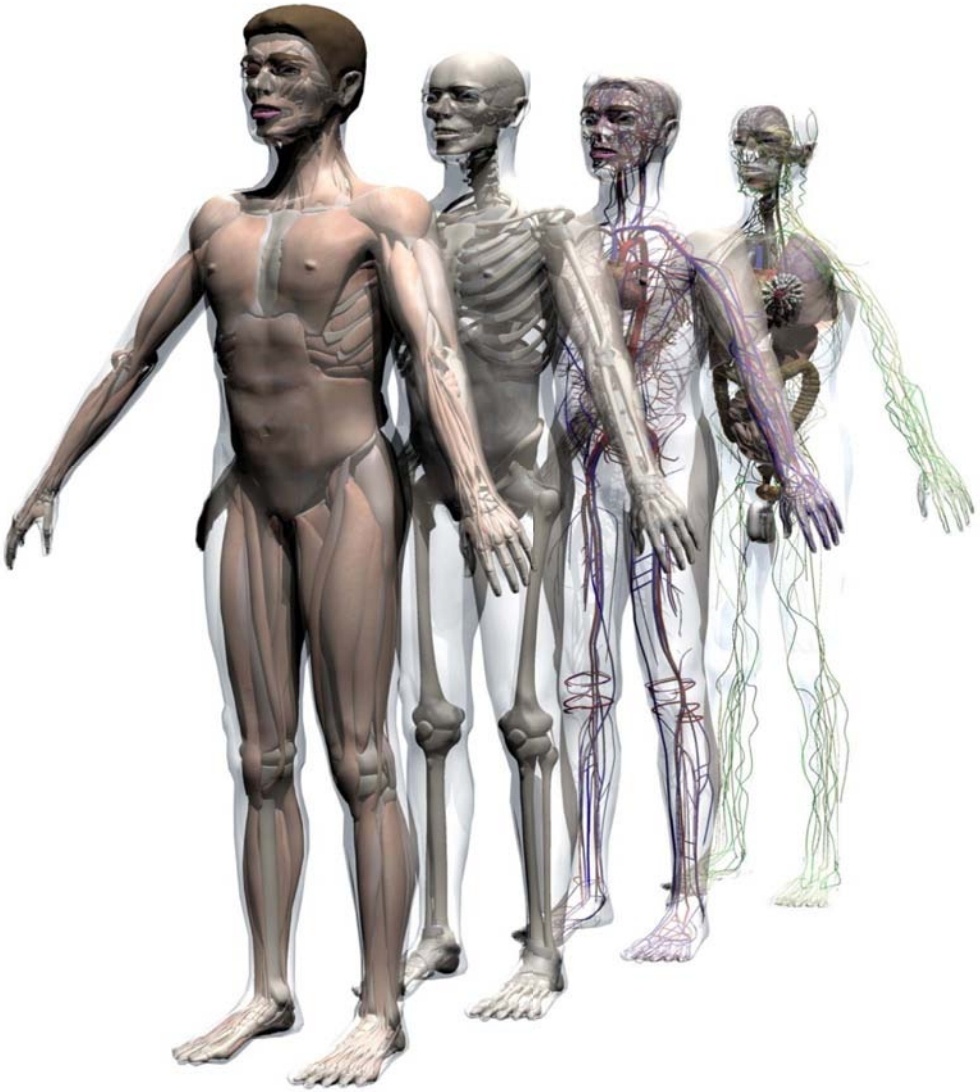
"Intelligent Machine" = "Intelligent Building"

*"Within a quarter-century, **non-biological intelligence** will match the range and subtlety of human intelligence. It will then soar past it."*

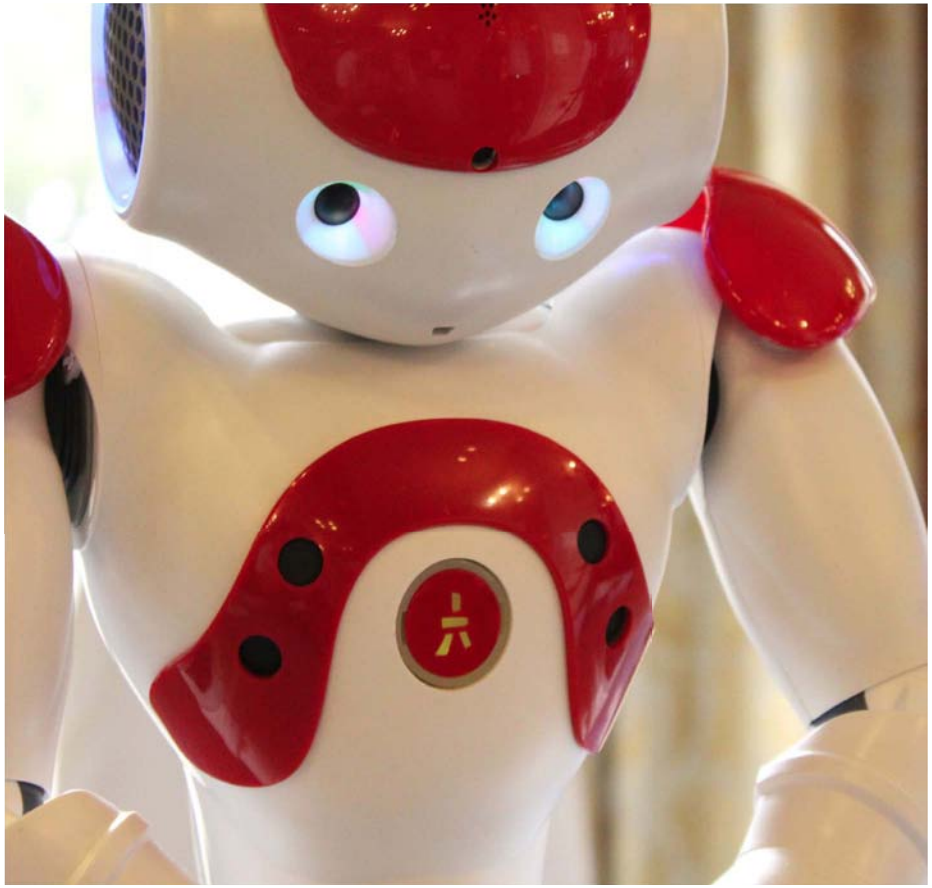
Ray Kurzweil, Singularity is Near

Singularity – 2049 and beyond …

NAPODOBOVÁNÍ STRUKTUR BIOLOGICKÝCH SYTÉMŮ? REVERSE ENGINEERING.

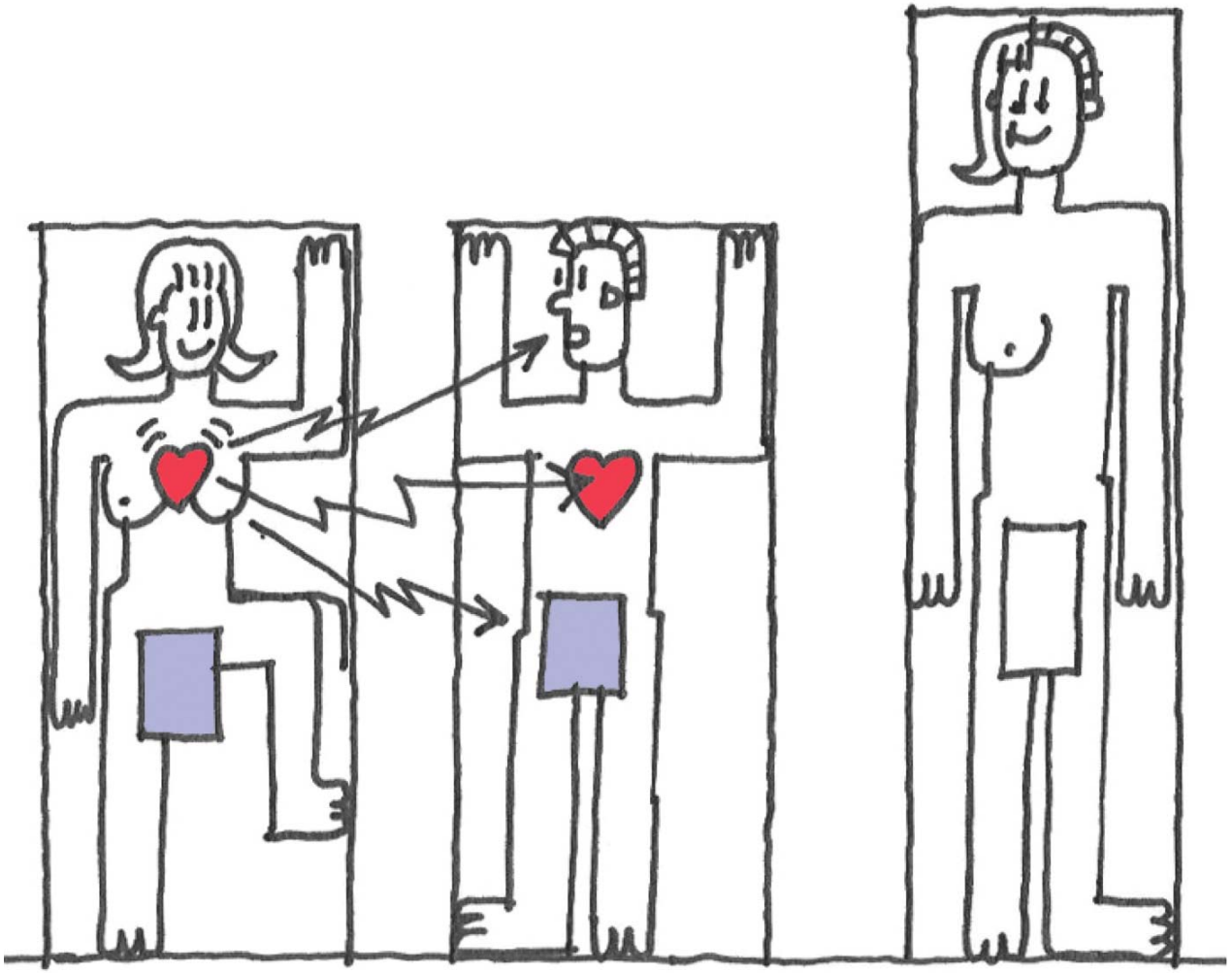


INTELLIGENT BUILDINGS = "INTELLIGENT MACHINES"

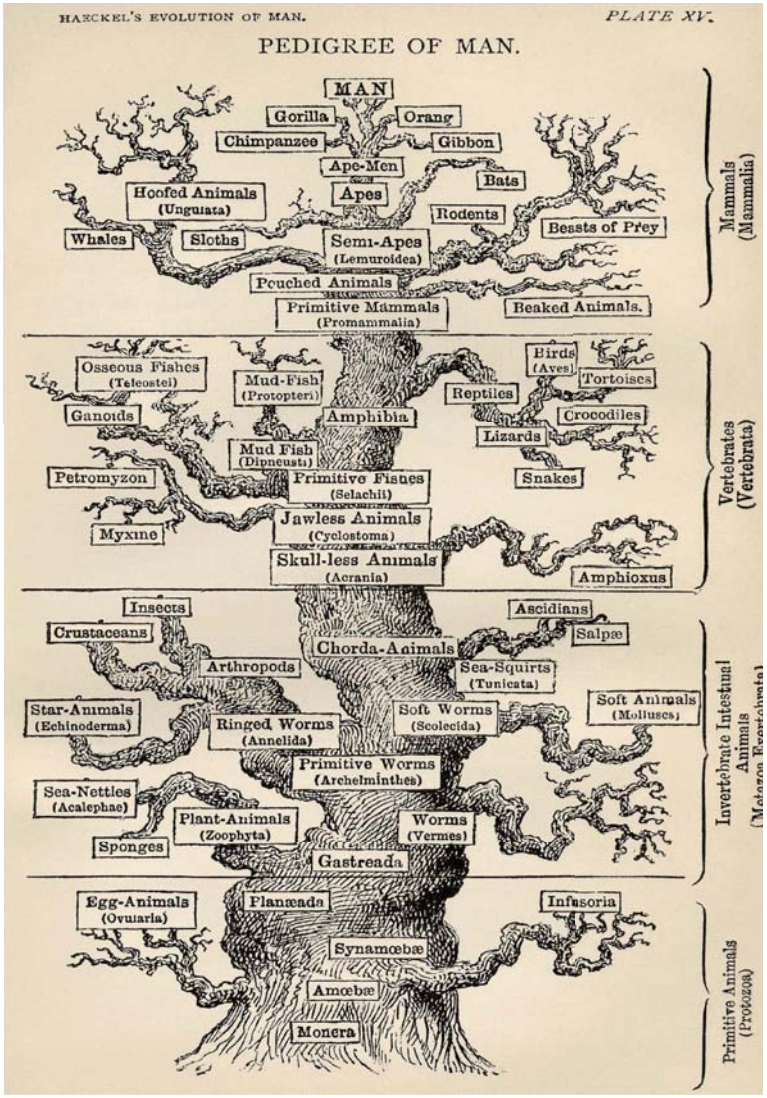


SAD ROBOT - REVERSE ENGINEERING OF THE BRAIN, SOUTH KOREA, THE ROBOT IS A "NAO" HUMANOID ROBOT PLATFORM, SAD IS AN EMOTION THAT WE RESERVE FOR BIOLOGICAL STRUCTURES. WILL FUTURE IB HAVE EMOTIONS?

INTELIGENTNÍ BUDOVY
EVOLUCE



KOEXISTENCE INTELIGENTNÍCH BUDOV S EVOLUČNÍM "ODPADEM"



NÁPRAVA CHYB V APLIKACÍCH NASAZENÝCH DO INTELIGENTNÍCH SYSTÉMŮ

ZPĚT V ČASE A … JAK DÁLE VEN Z PRAVĚKU IB

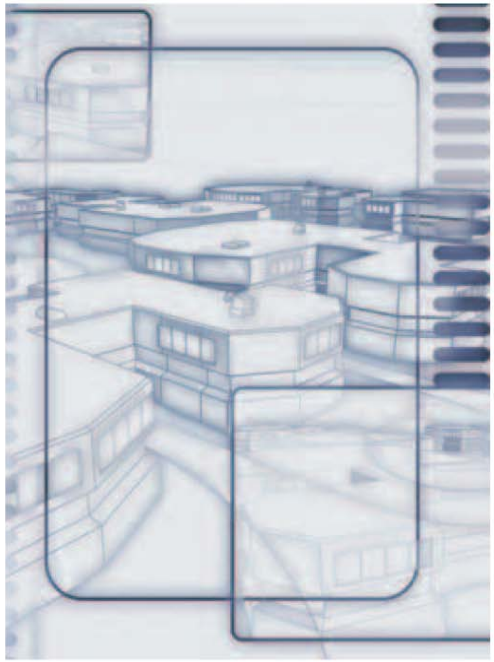
1970s BAC (Building Automation Systems)
1980s DDC (Direct Digital Control)
To 1985 Intelligent Buildings are buildings automatically controlled to function
1986 to 1991 Intelligent Buildings are buildings capable of responding to the changing needs
1992+ intelligent buildings are buildings with features effectively satisfying the changing needs…

2029 … 2049… **Singularity** is near and behind …

CABA AND...

A NEW DEFINITION OF INTELLIGENT BUILDINGS FOR ASIA

This paper, by Albert T.P. So, Alvin C.W. Wong and K.C. Wong, provides detailed definitions of intelligent buildings within the Asian-Pacific region and advocates for the adoption of a new pan-regional definition. The Asian Institute of Intelligent Buildings originally published this paper. The full version of this paper was published as a CABA Information Series and is available in CABA's Research Library at www.caba.org.



INTELLIGENT BUILDINGS ARE the future of the Asian building industry. All new commercial buildings and luxurious domestic buildings are designed with a common goal - to become intelligent buildings. However, the official definition of intelligent building has not yet been standardized around the world. In the U.S., an intelligent building is categorized by four basic elements, namely building structure, building systems, building services and building management. In Europe, the emphasis is on information technology and the genuine need of the user. In Singapore and China, it appears that the term "automation" has been dominating, with a great emphasis on high technology. It is our view that a proper definition of intelligent buildings should be based on users' needs instead of the image of the building itself.

The Public Works Department of the Singapore government stated that an IB must fulfill three conditions: (i) the building should have advanced automatic control systems to monitor various facilities, including air-conditioning, temperature, lighting, security, fire, etc. to provide a comfortable working environment for the tenants; (ii) the building should have good networking infrastructure to enable data flow between floors; and (iii) the building should provide adequate telecommunication facilities.

China's definition of intelligent buildings has placed emphasis on building control and communications using advanced technologies. In Shanghai, developers identify intelligent buildings as those that contain three automation functions: communication automation, office automation and building management automation. Some developers divide the fire alarm function from building automation, such that it becomes an independent fire automation system, while others will implement a comprehensive, maintenance automation system to integrate the various automation systems within a building.

In Japan, the definition of an intelligent building primarily revolves around the occupant and focuses on four aspects: (i) serving as a locus for receiving and transmitting information and supporting management efficiency; (ii) ensuring satisfaction and convenience for the people working in them; (iii) the rationalization of building administration to provide more attentive administrative services with lower cost; and (iv) fast, flexible and economical responses to changing sociological environments, diverse and complicated office work and active business strategies.

Regarding cultural considerations, intelligent buildings in Japan must maintain an effective working environment, run automatically and comprehensively, and be flexible enough to adapt to future changes in the needs of the working environment. Those needs include: a precise air-conditioning system that adapts to a variety of working environments; an antiglare lighting system; an area for refreshments; an atrium; a digital electronic exchange; an optical fiber LAN system; a self-contained intelligent system; a central monitoring system; an entry-exit control system; an automatic measuring and billing system; high-volume wiring system using cellular ducts and raised floor; high-load zone from 500 kg/m2 to 1000 kg/m2; and adaptability to parabolic antennas.

Japan's definition of intelligent buildings differs from other countries, especially those in the West, due to its particular consideration for occupants. We therefore believe that the Japanese definition of intelligent buildings is more suitable for modeling a universal definition for intelligent buildings in Asia and consequently have proposed a two-level strategy to define intelligent buildings in the region.

The first level would include nine quality environment modules, including:

- Environmental friendliness - health and energy conservation
- Space utilization and flexibility
- Human comfort
- Working efficiency
- Culture
- Image of high technology
- Safety and security measures
- Construction process and structure
- Life cycle costing

The second level would evaluate a number of key elements including functional requirements, functional spaces and technologies.

Functional requirements	Functional spaces	Technologies	
Electrical services	Raised ceiling	Fire detection	Fire fighting
Indoor touring guidance	Curtain wall	Plumbing and drainage	Artificial lighting
Daylighting	Raised floor	Public address	Structural monitoring
Training	Shared meeting and conference services	HVAC	Satellite conferencing
Maintenance management	Restaurants	PABX	Internet gateway
Roof and floor loading	Entertainment areas	Office automation	Gas supply
Property management	Floor height	Security control	Electric power quality monitoring
Building directory	Riser space	Voice mail	Video on demand
Asset and facilities auditing	Interior design	High speed data communication	Domestic hot water supply
Parking and public transportation	Emergency escape	Vertical transportation	Trend logging and analysis
Indoor air quality	Fixtures and furnishings	Building automation	
After hour operation	Cleaning	Energy saving	

Each of the nine key modules will be assigned a number of key elements, in an appropriate order of priority. With the two levels in hand, the following new definition for intelligent buildings can be formulated:

An intelligent building is designed and constructed based on an appropriate selection of quality environment modules to meet the user's requirements by mapping with the appropriate building elements to achieve long-term building value.

This new definition includes two dimensions: the needs of the building developers, owners, and occupants (deliverable items), and enabling intelligent building technologies (systems and services).

The integration of these two dimensions will generate values for the building (i.e. productivity, market values and energy conservation, etc.) that are measurable. In this way, each type of building will have a similar set of design criteria to determine whether they have intelligent building functionality.

IB RATING SYSTEMS

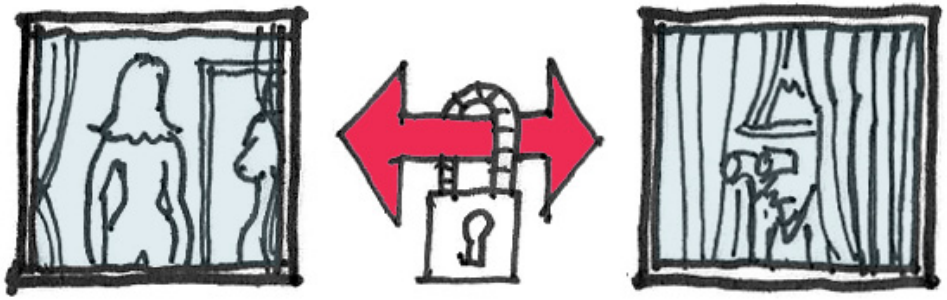
The main categories of criteria adopted in rating methods for IB assessment

Assessment clusters	Main modules by each assessment system					
	AIIB method [5,22] (Hong Kong, China)	BRE method [12] (UK)	CABA method [18] (Canada/USA)	IBSK method [39] (Korea)	SCC method [74] (Shanghai, China)	TIBA method [114] (Taiwan, China)
Architecture	Comfort	Built environment	–	Architectural design	–	Health and sanitation
	Health and sanitation	–	–	–	–	–
	Space	–	–	–	–	–
Engineering	High-tech image	Functionality	Automation	Electrical system	Conmunication	Info and comms
	Safety and structure	Responsiveness	Comms	Info and comms	Earthing	Safety and security
	Working efficiency	Suitability	Security	Mechanical system	Facility control	Structured cabling
	–	–	Structure	System integration	Fire accident control	System integration
	–	–	Systems	–	Int. integration	–
	–	–	–	–	Office automation	–
	–	–	–	–	Power supply	–
	–	–	–	–	Security	–
	–	–	–	–	Structured cabling	–
Environment	Green	–	–	Environment	Environment	Energy consumption
Economics	Cost effecticeness	Economic issues	–	–	–	–
Management	Practice and security	–	Property	Facility	Property	Facilities
Sociology	Culture	–	–	–	–	–

PRO "GREEN" HNUTÍ A ZAVÁDĚNÍ INTELIGENTNÍCH SYSTÉMŮ DO IB A IB SEKTOR
JE HODNOTÍCÍ SROVNÁVACÍ SYSTÉM NEZBYTNÝM NÁSTROJEM PRO MARKETING A PR

INTERVENCE DO SOUKROMÍ

Rozdílný práh rozlišení, kde je hranice, za kterou člověk svobodně nechá nakouknout kohokoliv, … ale kdo všechno se kouká?



Schopnost IB pronikat do soukromí – neviditelnost sběračů dat informací – nedostatečná ochrana

(dnes kamera, mobilní telefon, … inteligentní povrchy obsahující tyto "sběrače v nano velikostech nám neviditelných)

ZNALOST

&

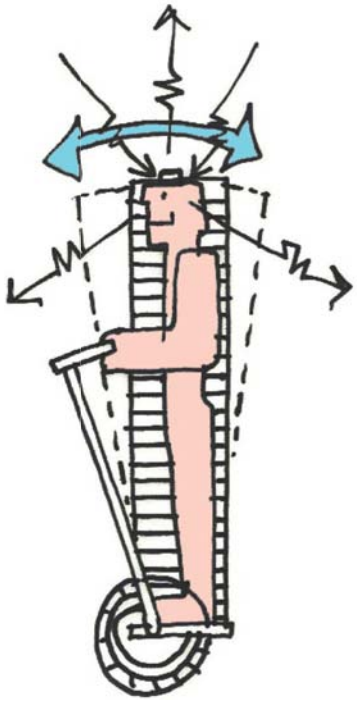
ARCHITEKT…

A NEBO “ARCHIKLON”? (ARCHICLONE)

INTELIGENTNÍ BUDOVY JAKO NEZÁVISLÉ INTELIGENTNÍ STRULTURY

Knowledge Base for Designer

- Infrastructure for Building Technology Systems
  - Cabling and Wireless Systems
  - Equipment Rooms
  - Broadband Voice and Data Services
  - Structured Cabling System
  - System Reliability and Redundancy Considerations
- Control and Data Networks
  - Control Network Protocols
  - Local and Wide Area Network Protocols
  - Hardware Considerations
  - Enterprise Facility Systems Control and Monitoring
  - Enterprise Energy and Building System Databases
  - System Administration and Network Management
  - Integration with Enterprise Applications
- Overview of Building Technology Systems
  - Control Networks
  - Data Networks
  - Voice Networks
  - Audio Visual Systems
  - Video Distribution Systems
  - Fire Alarm Systems
  - Video Surveillance Systems
  - Access Control Systems
  - Heating, Ventilating and Air Conditioning Systems Control
  - Electric Power Management Systems
  - Lighting Control Systems
  - Vertical Transportations Systems
  - Parking Control Systems
  - Other Systems
- Facility Management Systems
  - Property Management Systems
  - Computerized Maintenance Management Systems
  - Enterprise Energy Management
  - Enterprise Asset Management
  - Integrated Workplace Management Systems
- Design and Installation
  - Regulations, Standards and Codes
  - Building Types
  - Building Design Process
  - Building Construction Process
  - Project Management



http://caba.org/councils/CABACertificationPresentation060508.ppt

INTELIGENTNÍ BUDOVY JAKO NEZÁVISLÉ INTELIGENTNÍ STRULTURY

Table 1: Intelligent Building Roles	
Acoustic Engineer	Information Technology
Alternative Energy Specialist	Interface Designer
Architect	Interior Design
Audiovisual Designer	Landscape Architect
Backup Power Engineer	LEED Accredited Professional
Building Owners	Lighting Design Engineer
Carpenter	Lighting Designer
Chief Facilities Officer	Mechanical Engineer
Chief Information Officer	MEP Engineer
Chief Security Officer	Network Engineer
Civil Engineer	Network Manager
Commissioning Agent	Operations Manager
Communication, Life-safety, and	Plumber
Automation Consultant	Process Engineer
Construction Manager	Product Representative
Construction Specifier	Professional Engineer
Consulting Engineer	Program Manager
Contract Administrator	Programmer
Contractor	Project Manager
Control Systems Engineer	Risk Manager
Data Center Designer	Security Specialist
Daylighting Designer	Space Planner
Developer	Structural Engineer
Documentation Specialist	Sustainable Design Engineer
Electrician	Systems Administrator
Energy Engineer	Systems Integrator
Energy Manager	Telecommunications Specialist
Facilities Engineer	Transport Engineer
Facilities Manager	User Interface Designer
HVAC Designer	Wireless/Radio Engineer
Indoor Air Quality Professional	Workflow Designer

CITY OF THE SUSTAINABLE FUTURE…

KOMUNIKACE

“SMART” GOVERNMENT

SOCIÁLNÍ SÍTĚ

ALTERNATIVNÍ ZDROJE ENERGIE

“SMART” CITY, IB…

DOPRAVA LIDÍ

ZASOBOVÁNÍ VODOU

ZASOBOVÁNÍ,…

MĚSTA

&

INTELIGENTNÍ BUDOVY

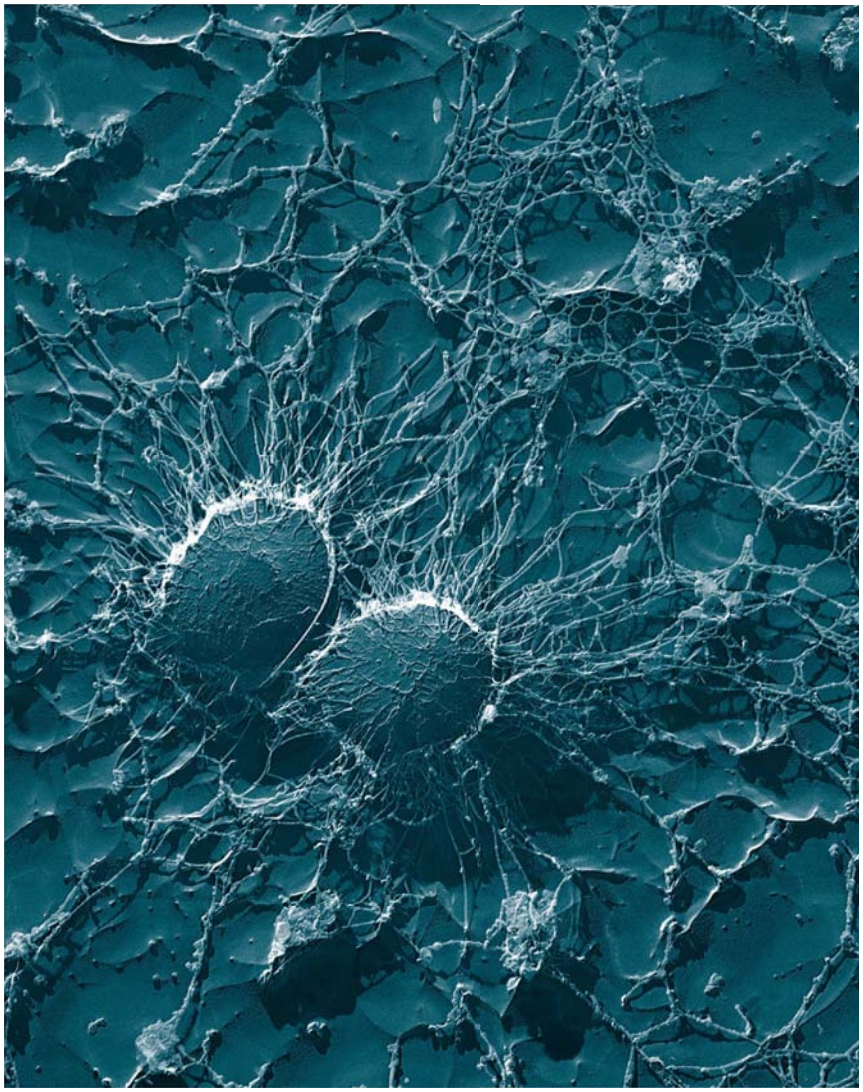
A “KOLONIZACE” NOVÝCH ÚZEMÍ

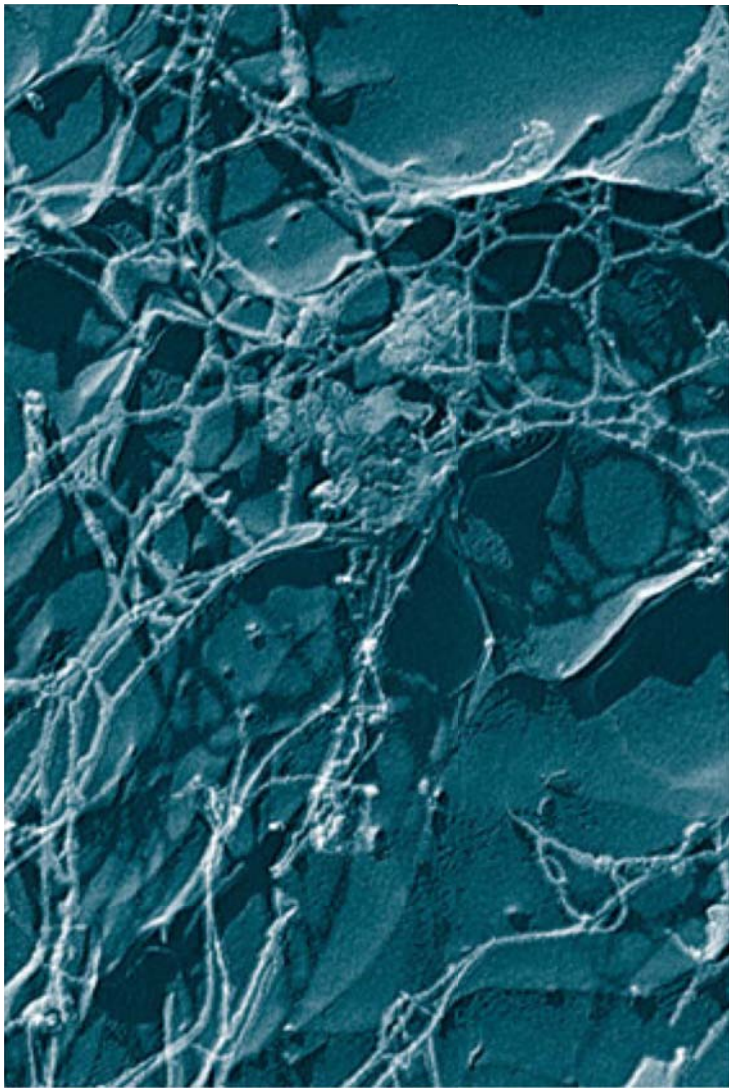
I.B.BLOX©

I.B.BLOX - INTELIGENTNÍ BUDOVY JAKO DLOUHODOBĚ SOBĚSTAČNÉ JEDNOTKY

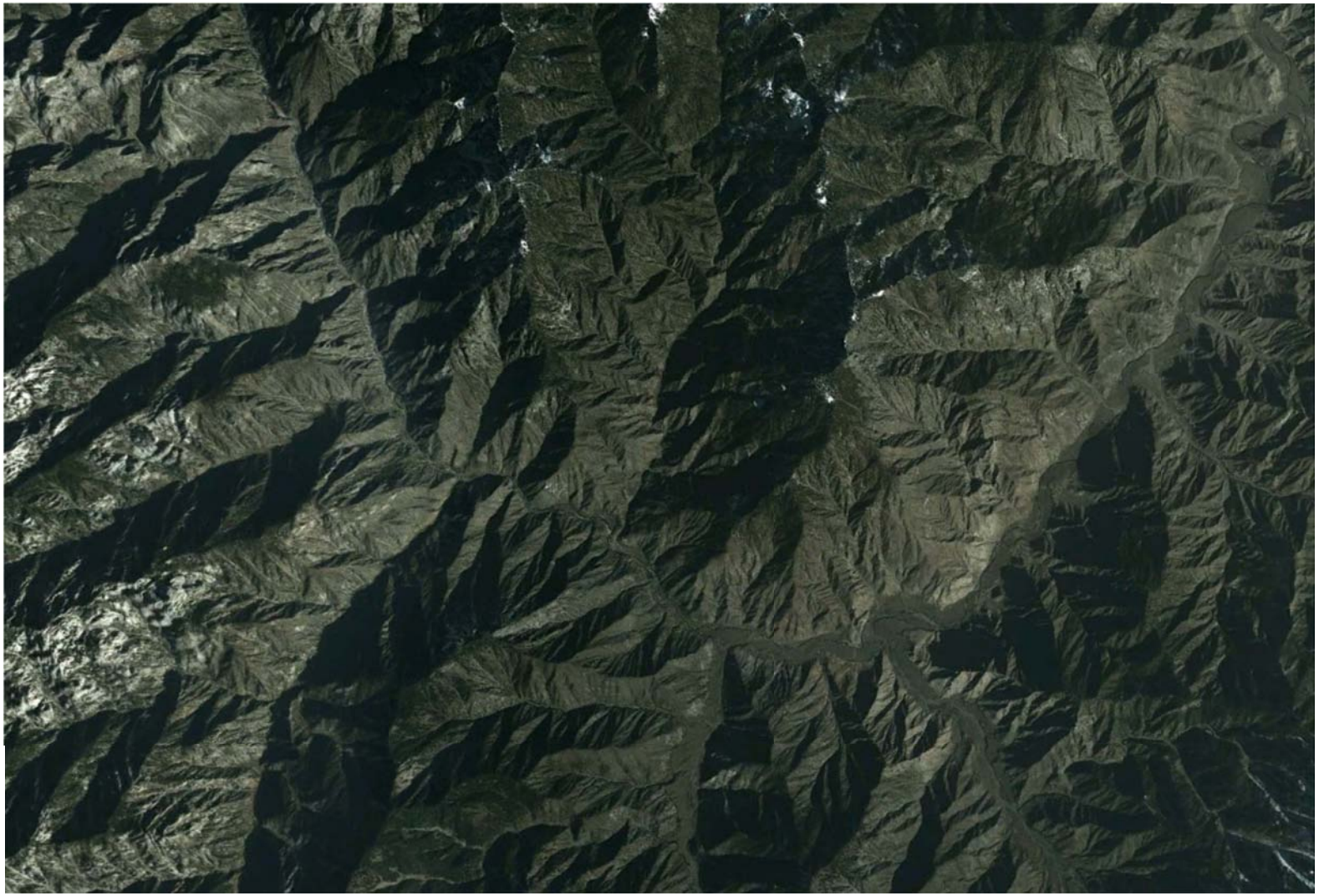
PLUG & PLAY
VYMĚNITELNÉ MODULY ZDROJŮ NA OBJEDNÁVKU
OPAKOVATELNOST SE SCHOPNOSTÍ ADAPTACE
MODULOVÁ “TVAROVÁ PAMĚT” SCHOPNOST
RYCHLÁ REPRODUKCE
OPAKOVÁNÍ - EKONOMICKÁ VÝHODNOST
NEZÁVISLOST NA “EVOLUČNÍM” ODPADU
RYCHLE VYTVÁŘENÍ URBANISTICKÝCH STRUKTUR
“URBANOIDY” - MODULY V INTELIGENTNÍM “PATTERNU”
ALTERNATIVNÍ A STŘEDNĚDOBÉ OSÍDLOVÁNÍ

INTELIGENTNÍ BUDOVY JAKO NEZÁVISLÉ INTELIGENTNÍ STRULTURY – “URBANOIDS”

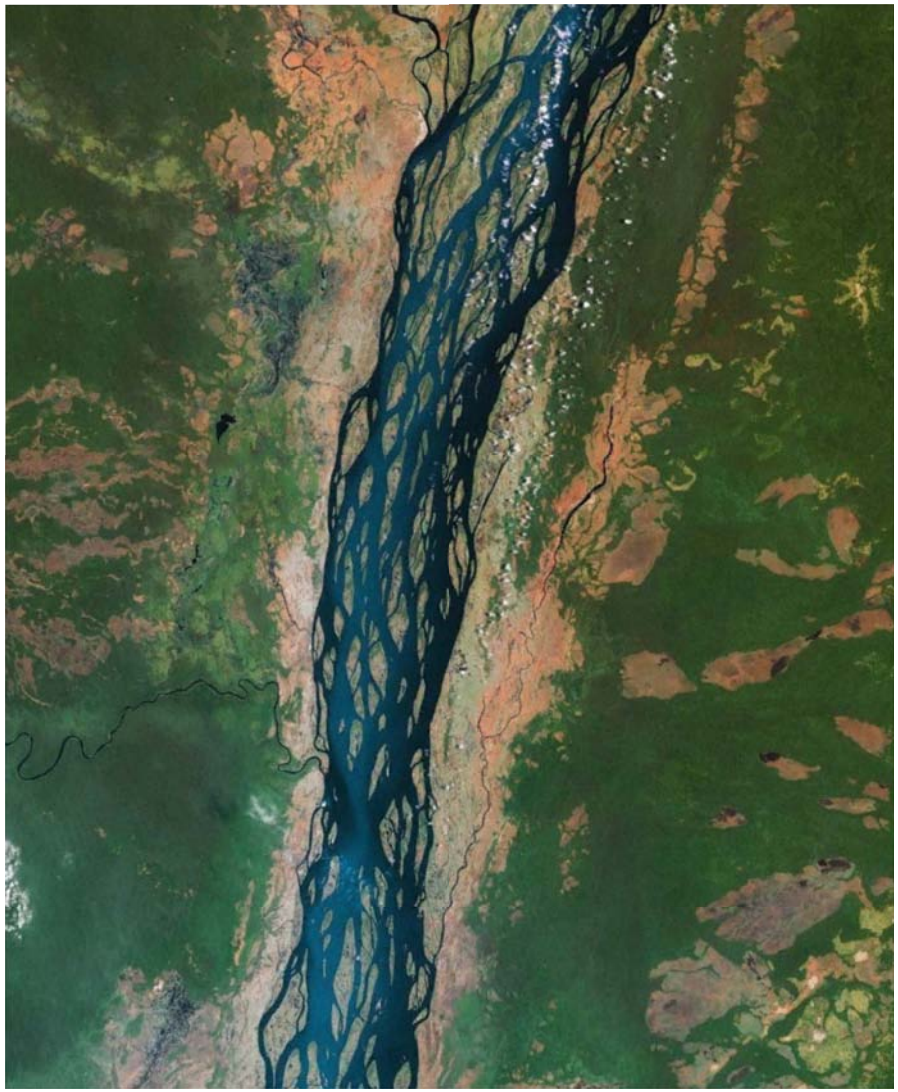


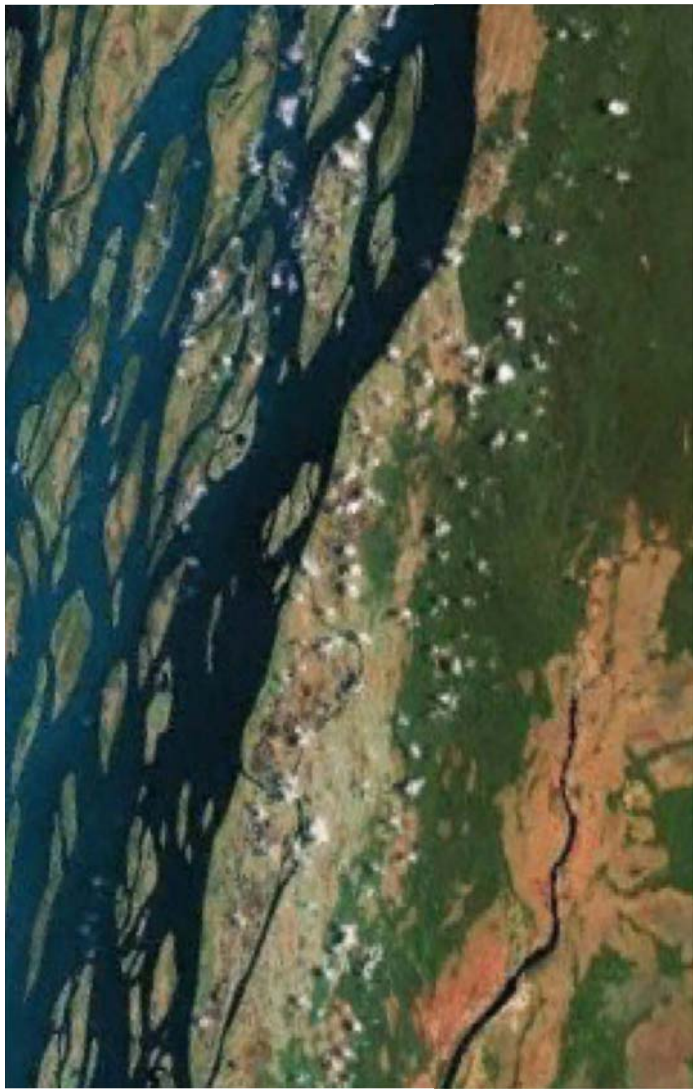


INTELIGENTNÍ BUDOVY
ROZŠÍŘENÍ DO “NEHOSTINNÝCH” POLOH

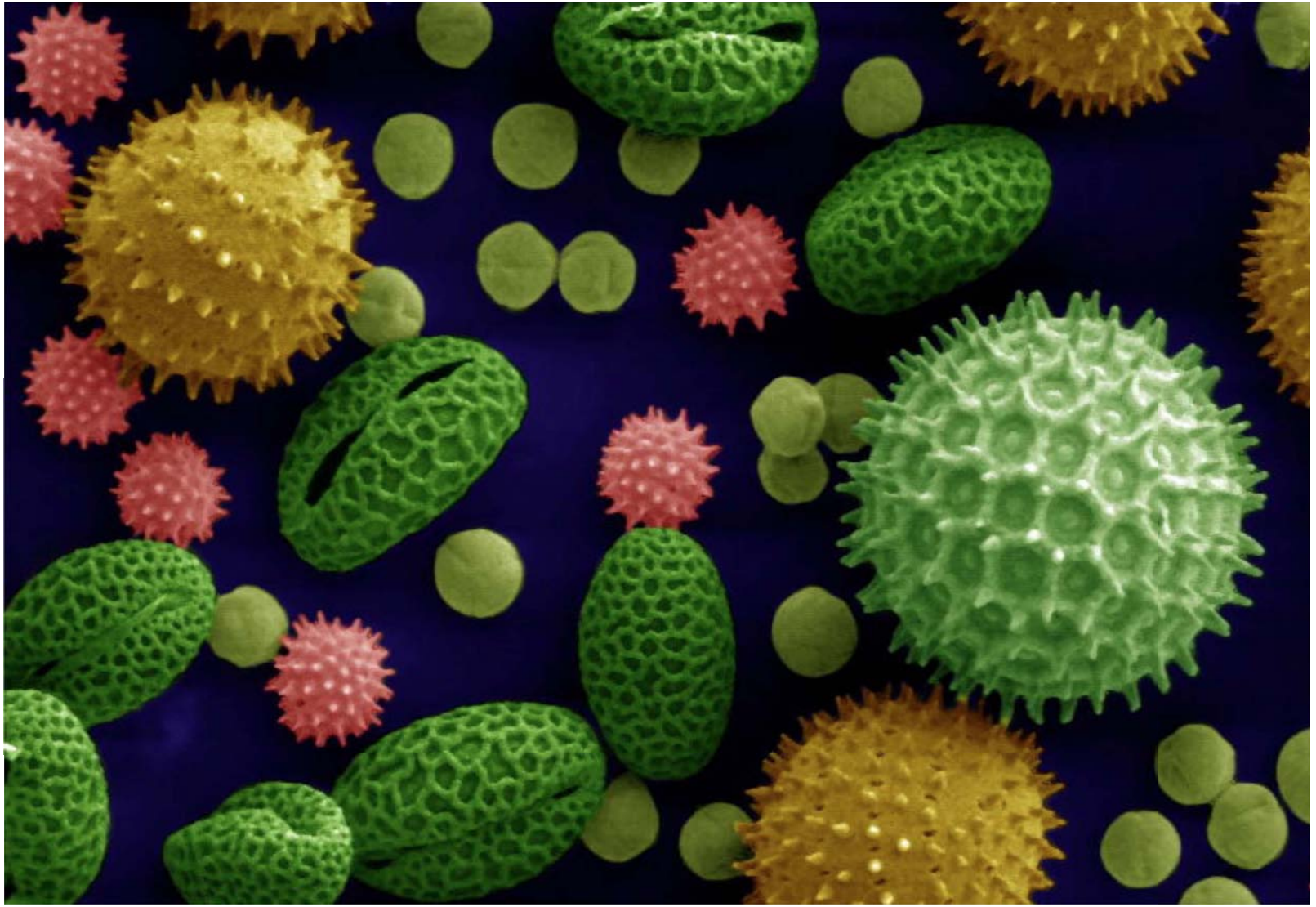


INTELIGENTNÍ BUDOVY
DROPS (KAPKY) BEZ PATTERNU

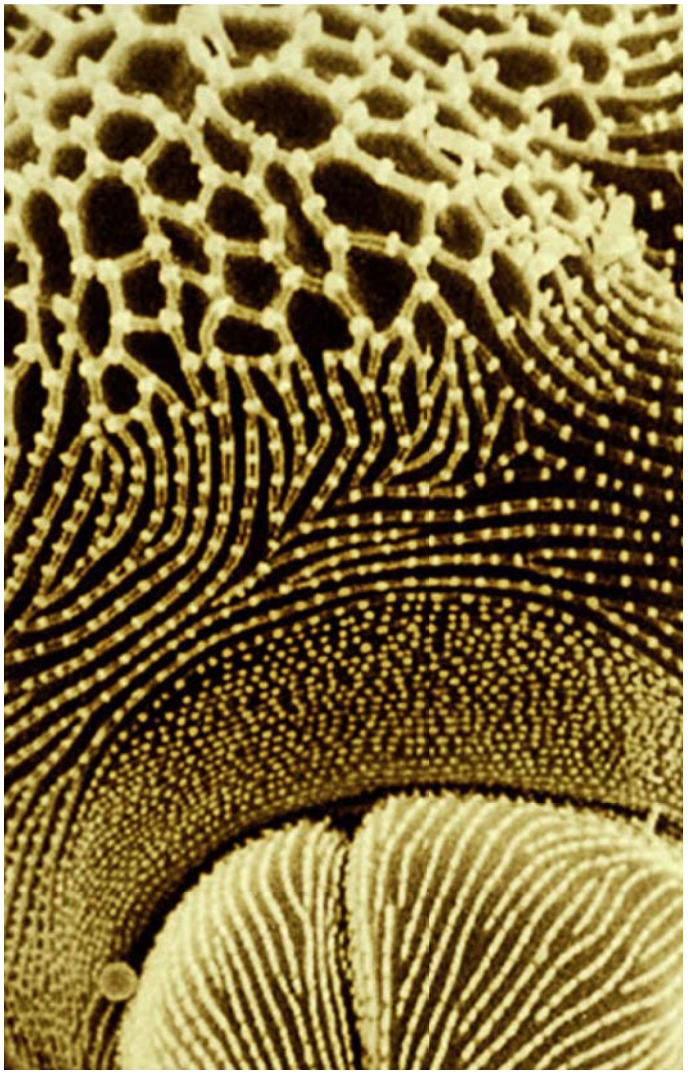




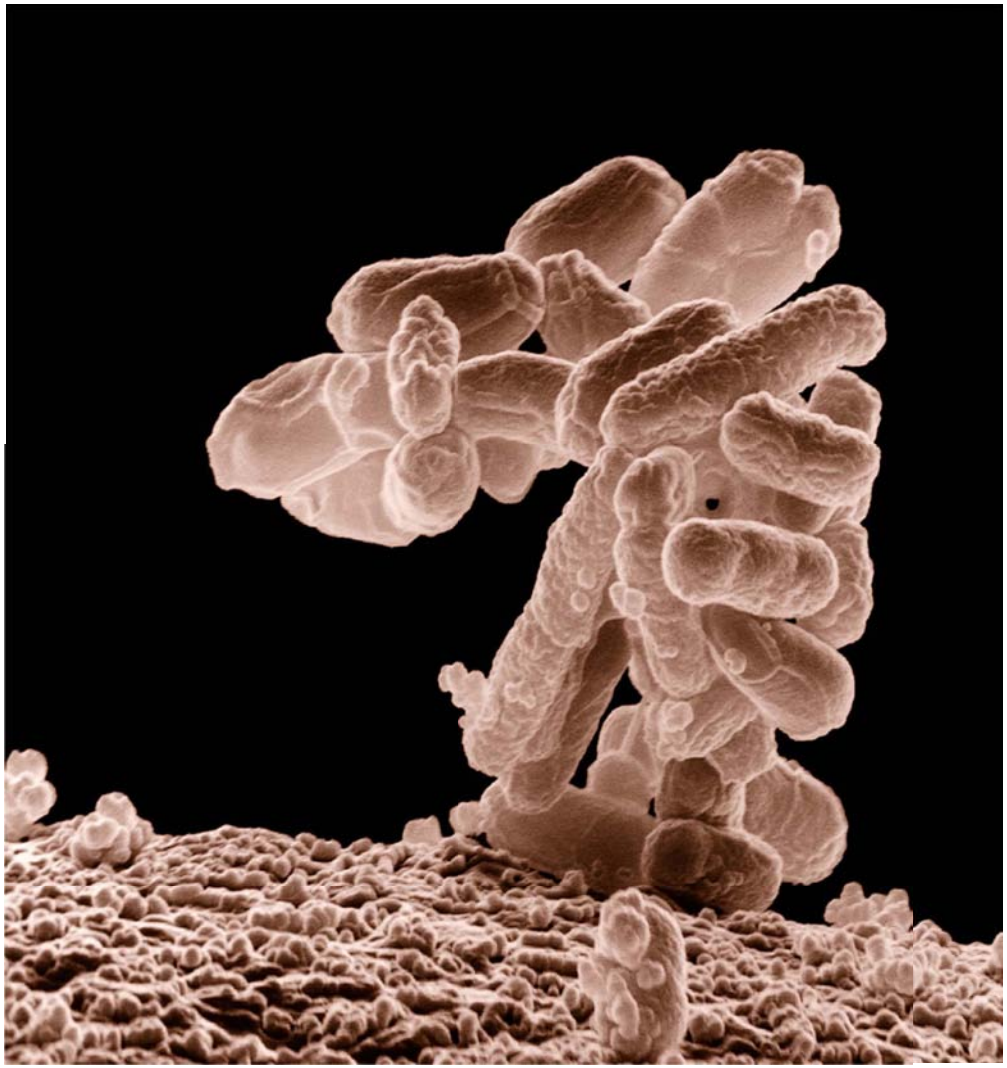
INTELIGENTNÍ BUDOVY
“SHELF” PRODUKTY

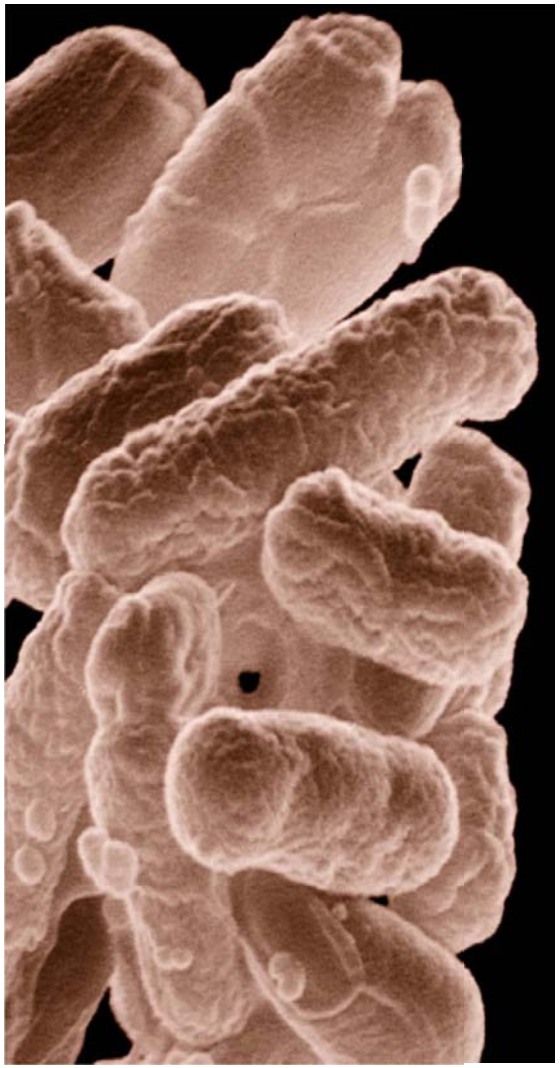


INTELIGENTNÍ “SYMBOLY” ORGANIZOVANÉ V PATTERNECH

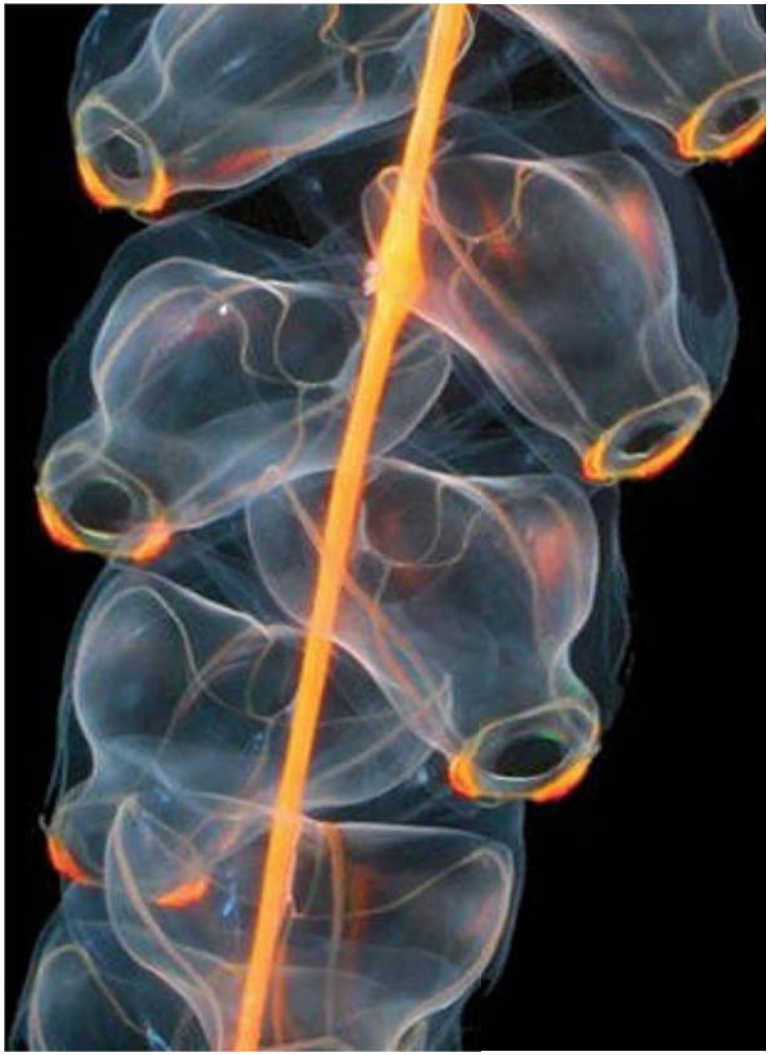


NEZÁVISLE STRUKTUROVANÉ IB – “URBANCLONES” JAKO INTELIGENTNÍ ELEMENTY INT. STRUKTUR





VIRTUÁLNĚ NEOMEZENÁ TVAROVÁ VOLNOST INTELIGENTNÍCH BUDOV A SDRUŽENÍ IB



…A ZPĚT DO PRAVĚKU…

THE END?