MOSCOW STATE (NATIONAL RESEARCH) UNIVERSITY OF CIVIL ENGINEERING

RUSSO-BRITISH CHAMBER OF COMMERCE

ДЕПАРТАМЕНТ ГРАДОСТРОИТЕЛЬНОЙ ПОЛИТИКИ ГОРОДА МОСКВЫ

City service management based on socio-cyber-physical approach

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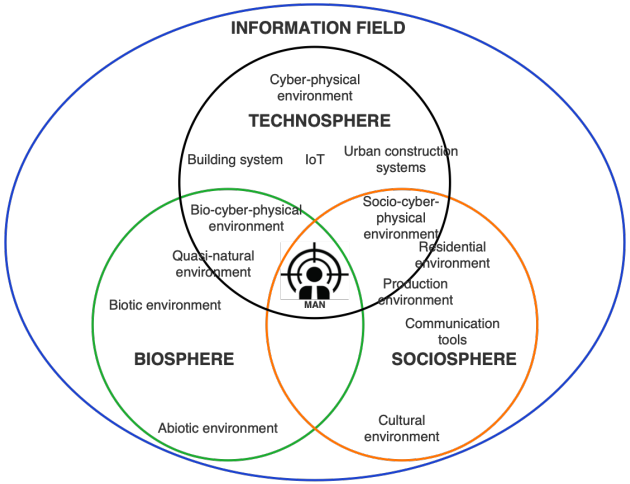
1.1 Information technologies in city management

Human-centered approach

KEY ELEMENTS OF SMART CITY

- **«Smart Economy»** — Competitiveness of the city
- **«Smart People»** — Social and human capital
- **«Smart Governance»** — Community involvement in city governance
- **«Smart Mobility»** — Effective transport infrastructure
- **«Smart Environment»** — Efficient urban environment
- **«Smart Living»** — High quality of life

BUILDING A COMFORTABLE LIVING ENVIRONMENT FOR HUMANS



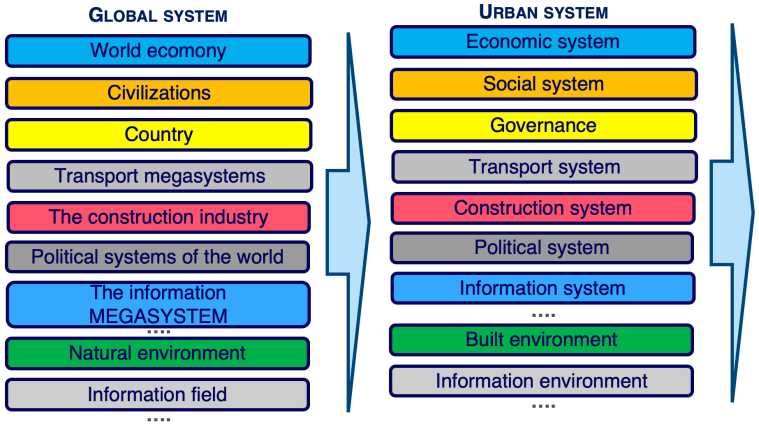
CONSUMERS

1. **City resident** - any person (child or adult) who spends most of the year in that city, as well as belonging to one or more urban communities;
2. **Temporary resident** - any person who spends short periods per year in the city: tourist, person on business trip, etc.;
3. **Business community** - a group of people, from individual entrepreneurs to representatives of large corporations, who pursue business interests in the city in question;
4. **City administration** - a group of people responsible for the management of the city and the formation of a comfortable urban environment and representing the state power to some extent.

Conclusion 1: All information systems of the city are used to collect all available information to ensure the sustainable development of the urban environment. The city is transforming from a set of individual functions and services into interconnected system that continuously interacts with people.

1.2 Information technologies in city management

Every urban system is part of a global one



DIGITAL CITY is systems of **Socio-Cyber-Physical Systems**, and that there are emerging opportunities to introduce digital nervous systems, intelligent responsiveness, and optimization at every level of system integration

Socio-Cyber-Physical Systems (SCPS)

Finite set of components of the functional (elements, anthropogenic objects, the computing resources integrated into physical processes), technical-economical, social and the relations in between, selected according to a certain purpose in the certain georeferenced space (volume) within a certain time slot.

Information model (IM)

An information model is a representation of concepts, relationships, constraints, rules, and operations to specify data semantics for a chosen domain of discourse[3].

City digital twin

The digital twin of the urban system - is the information model of the socio-cyber-physical urban system integrated with this socio-cyber-physical system through communication networks and information collection and processing systems, based on adequate algorithmic models.

2.1 City services

Smart city is a new information urban environment

Smart city Technology levels	Technological level the Description of the characteristics	Implemented functions of the digital economy
Digital Economy		
4. Client level	Service delivery interfaces	City services: feedback, Parking, campus map, community engagement and etc
3. Service level	Collection and aggregation of different types of services from different providers	Service management on the territory of the city: Define the rules for service providing, service interfaces and data exchange formats, level and quality of service
2. System level	City-wide technology platform	Formation of the city digital twin Life cycle management of digital twins of urban objects A single reliable source of information about the city
1. Level of telecommunication infrastructure	1.b Foundation for IoT Networking 1.a Basic Telecommunications Services	The provision of broadband access to the Internet. Data collection and pre-processing
0. Level of physical urban infrastructure	Physical urban infrastructure: Buildings, Roads, Utilities, etc.	The providing of basic (Existence) needs: utilities, transport, security, etc.
Traditional Economy		

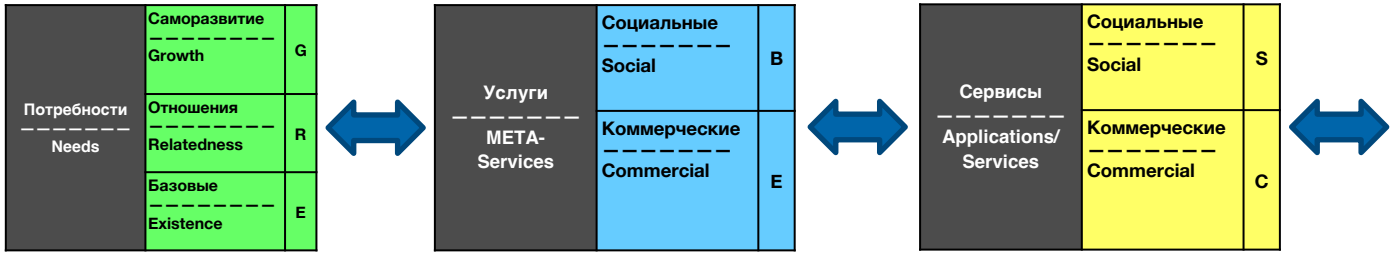
2.2 City services

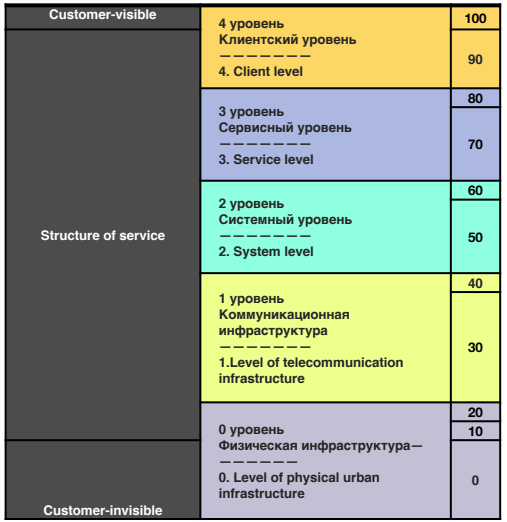
META-Services

Analysis of needs of inhabitants

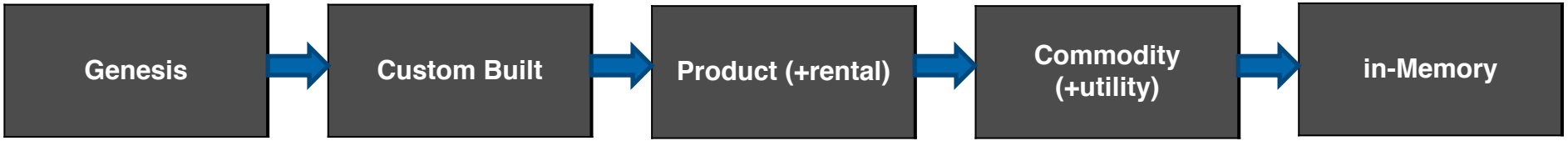
Development of META-services

Implement META-services in real application or physical infrastructure



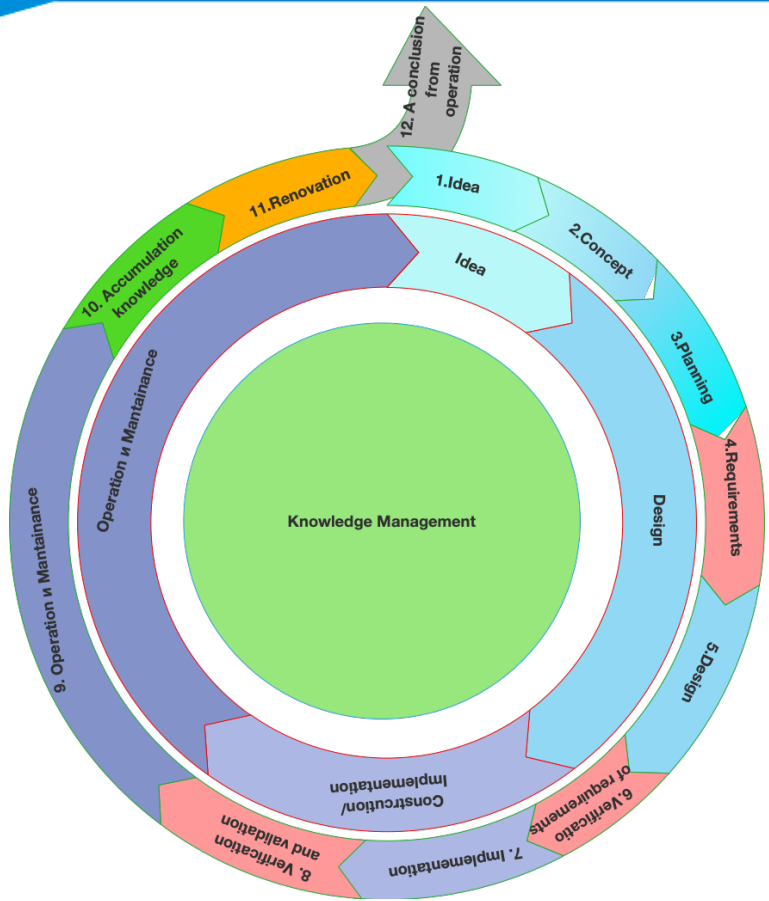


Development stages of city services



2.3 City services

Lifecycle of city services



Genesis Зарождение продукта/услуги											
1	2	3	4	5	6	7	8	9	10	11	12

Custom Built Персональный продукт/услуга											
1	2	3	4	5	6	7	8	9	10	11	12

Product (+rental) Известный продукт/услуга											
1	2	3	4	5	6	7	8	9	10	11	12

Commodity (+utility) Массовый продукт/услуга											
1	2	3	4	5	6	7	8	9	10	11	12

in-Memory Продукт в базе знаний
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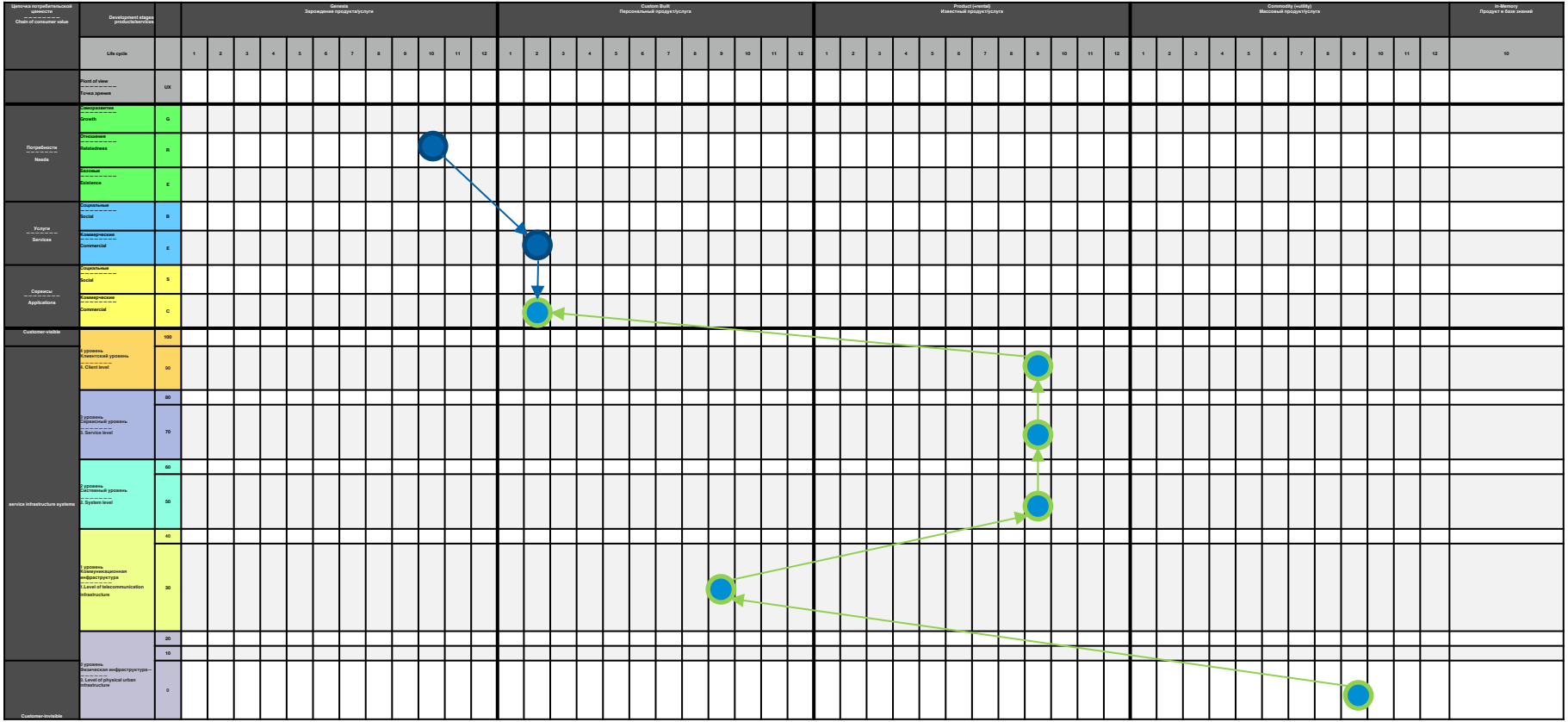
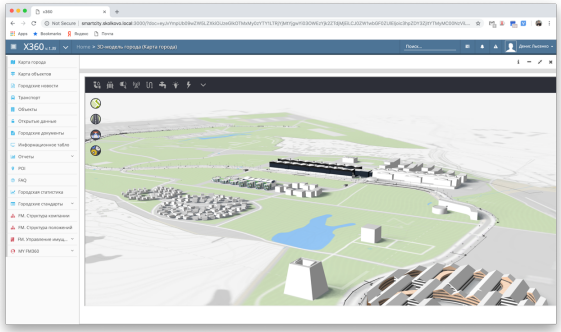
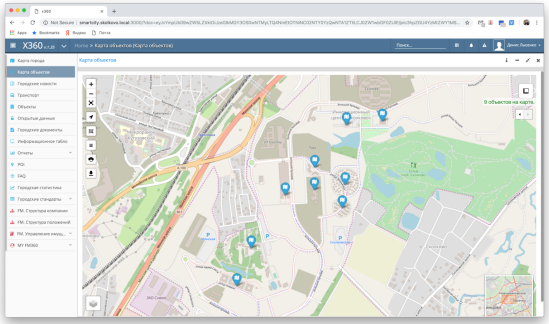
3.1 CITY SERVICES MANAGEMENT

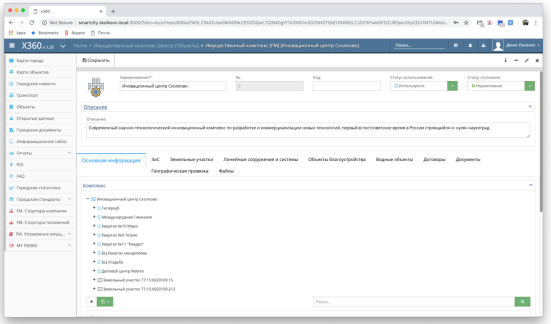
Urban Services Analysis Matrix

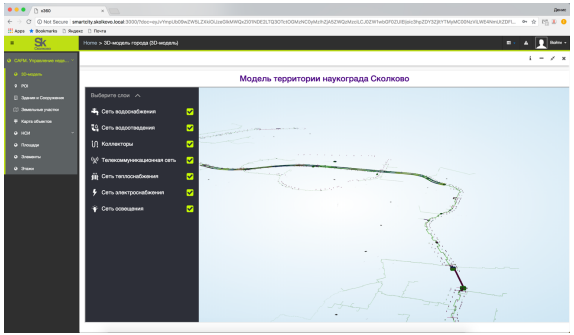


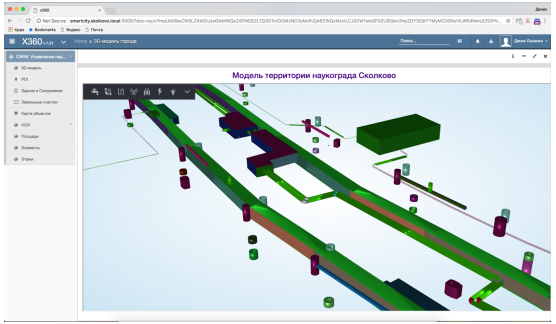
3.2 Examples








Модель территории наукограда Сколково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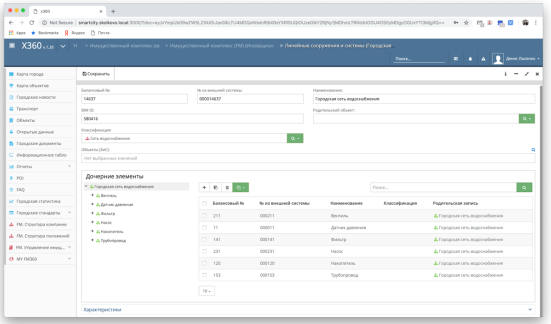

GENERAL STANDARD INFORMATION MODELING

Materials are available for collaboration at:

https://github.com/vserge/DigitalCity

Also available soon
https://calc.city

Thank you for your attentions

Спасибо за внимание!

СТРОИТЕЛЬНЫЙ УНИВЕРСИТЕТ

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