primary (p-xxx)
administrative (p-3xx)
meeting room (p-330)

amenity (v-xxx)
hygiene (v-1xx)
toilet (v-130)

circulation (k-xxx)
horizontal (k-1xx)
transit (k-120)

technical (t-xxx)
technology (t-1xx)
other (t-190)
stacker technology (t-190-9)

Critical Success Factors for Management of digital data in Projects

1.3.2023

Zdeněk Rudovský,
BIM manager

IFMA™ Switzerland Chapter
International Facility Management Association

Zürcher Hochschule für Angewandte Wissenschaften
zh aw

CTU
CZECH TECHNICAL UNIVERSITY IN PRAGUE

Dr. Zdeněk Rudovský

- BIM manager, Department of construction and investment, Rector’s Office, CTU in Prague
- BIM manager, Department of Construction, New Nuclear Power Plant in Dukovany Site, ČEZ
- FM-data related specialist, openBIM promoter, experienced in government-BIM data standardisation

Dr. Simon Ashworth, Mitarbeiter am IFM der ZHAW, Moderation

- Forschungsschwerpunkt BIM und andere Digitalisierungsthemen in Bezugauf Immobilien und FM
- Über mehr als 20 Jahre praktische FM-Erfahrung aus den Unternehmen Serco sowie der britischen Verteidigungsakademie
- Seine Forschungsergebnisse sind unter Researchgate frei verfügbar

Ing .arch. Zdeněk Rudovský, Ph.D.
Odbor výstavby a investiční činnosti,
ČVUT v Praze

Zdeněk Rudovský

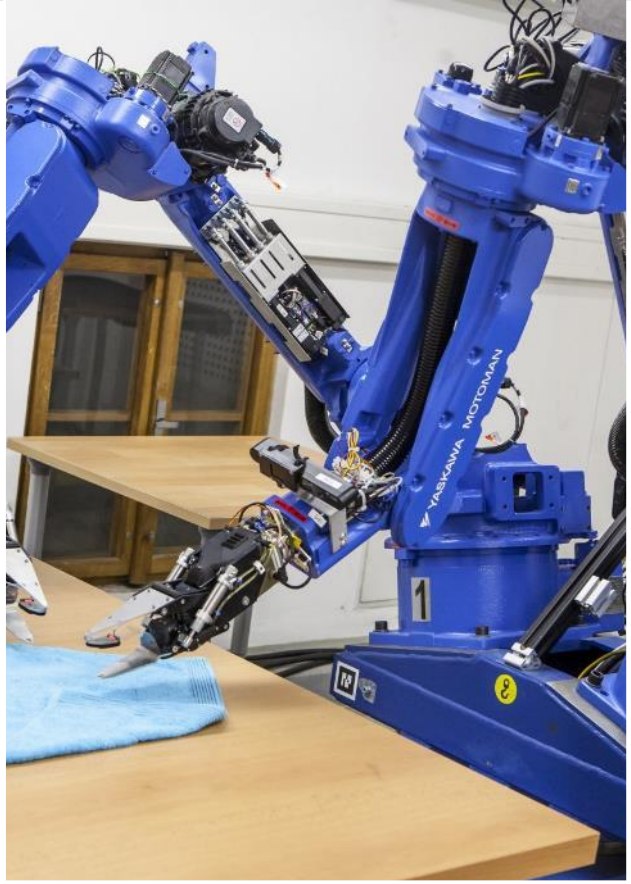
bim.cvut.cz

BIM manager,

Department of Construction and Investment,

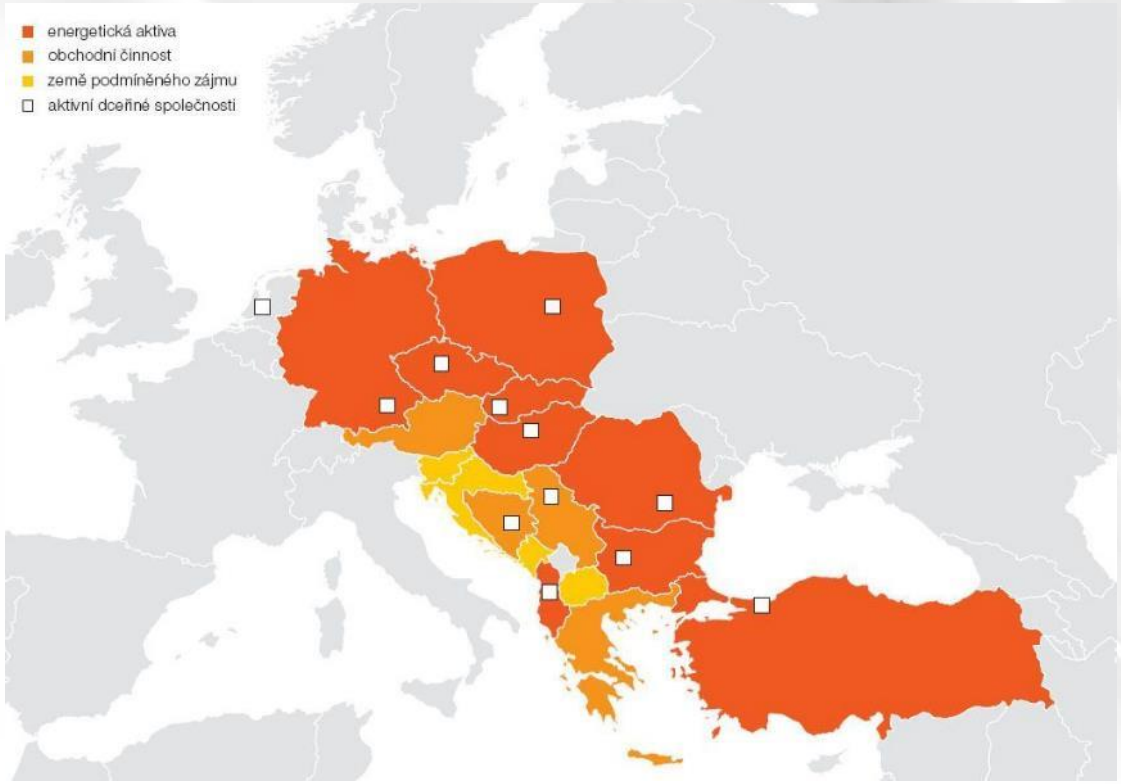
Rector’s Office,

Czech Technical University in Prague

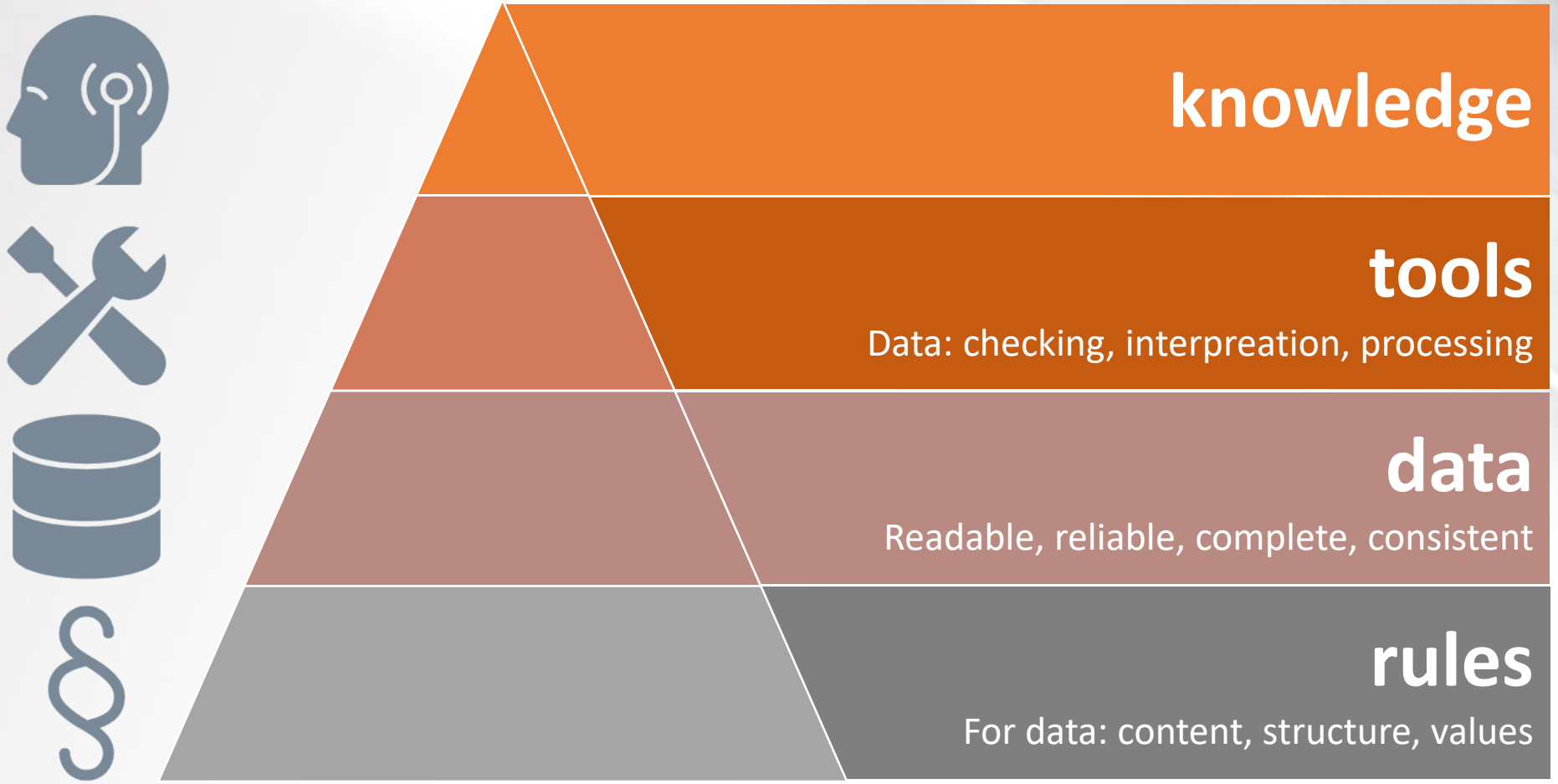


CTU in Prague (ČVUT v Praze)

BIM manager,
Department of Construction,
New Nuclear Power Plant in Dukovany Site


energetická aktiva
obchodní činnost
země podmíněného zájmu
aktivní dceřiné společnosti

Critical success factors





Content

Space measurement and classification standard

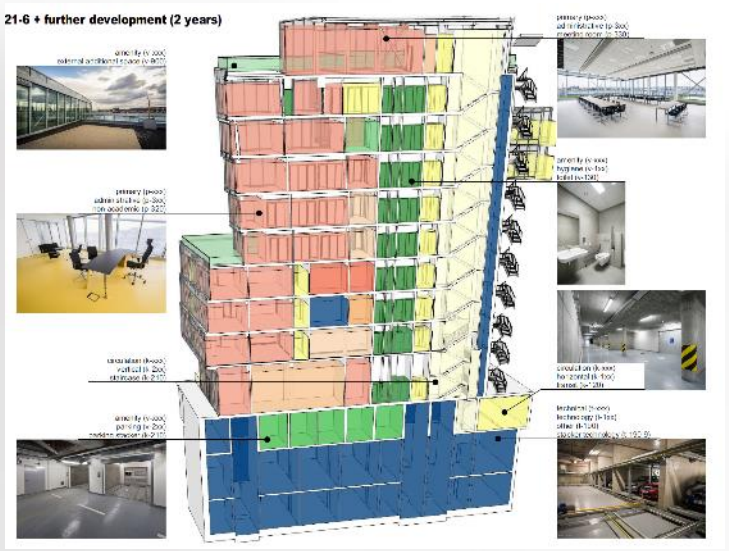
(standard based on EN 15221-6)

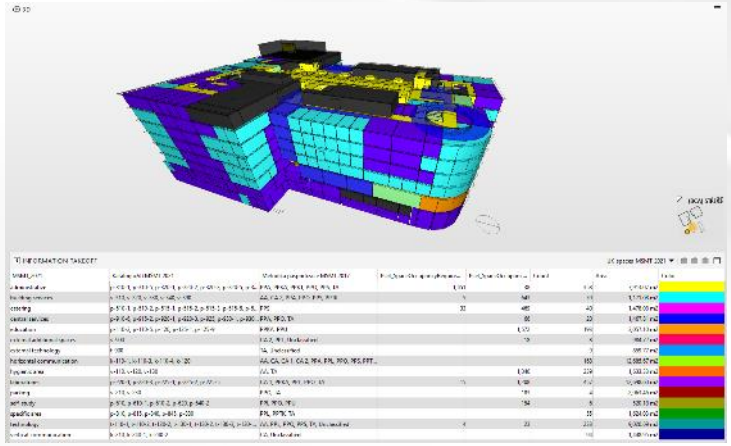
QA/QC in bim data driven projects

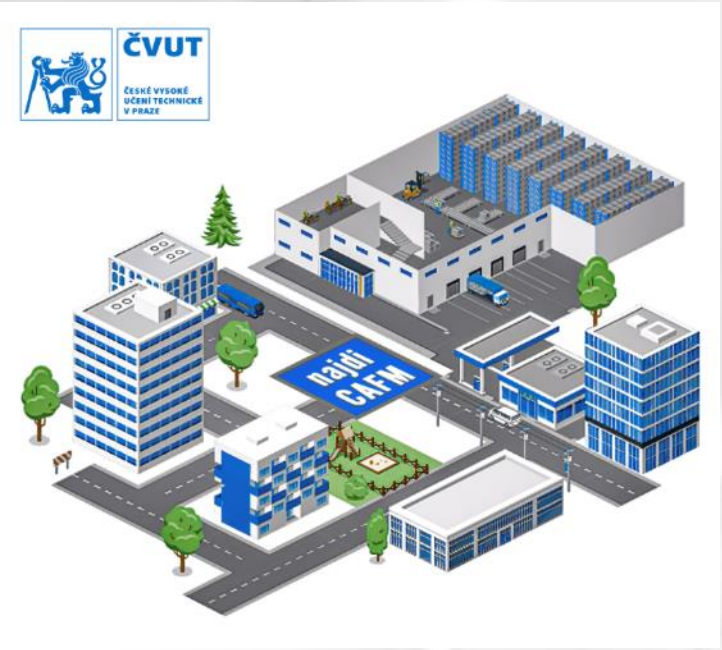
FindCAFM.com

Benchmark of CAFM systems

Content


21-6 + further development (2 years)




ČVUT
ČESKÉ VYSOKÉ UČENÍ TECHNICKÉ V PRAZE
najdi ČAFM

Content

Space measurement and classification standard

The need for a clear standard

Current/former status of portfolios

How are the resources distributed

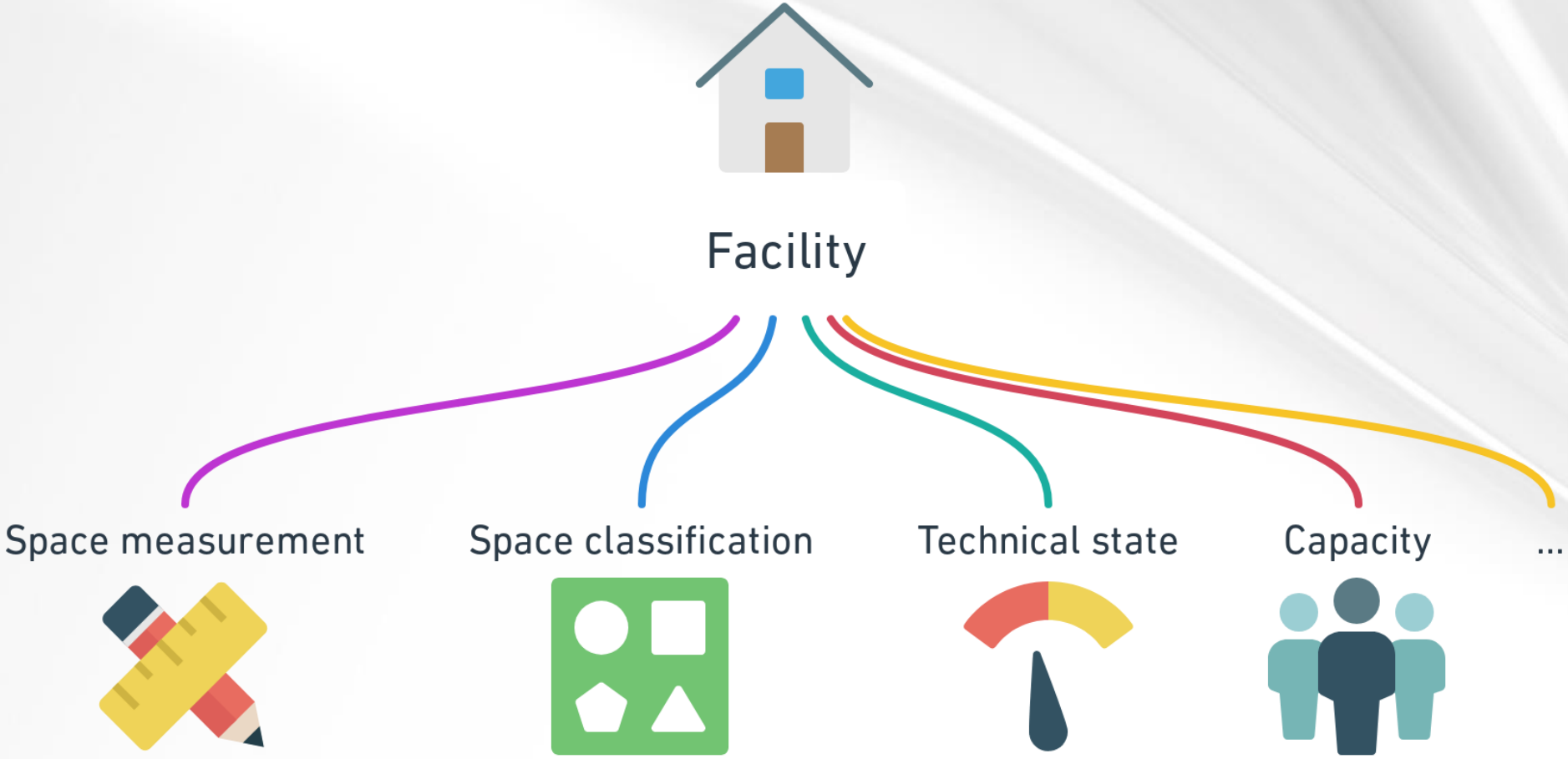
21 public universities

110 mil. Euro spent on university construction projects

Ministry of education, youth and sports

10 mil. Euro spent by CTU in Prague in 2022 on construction projects

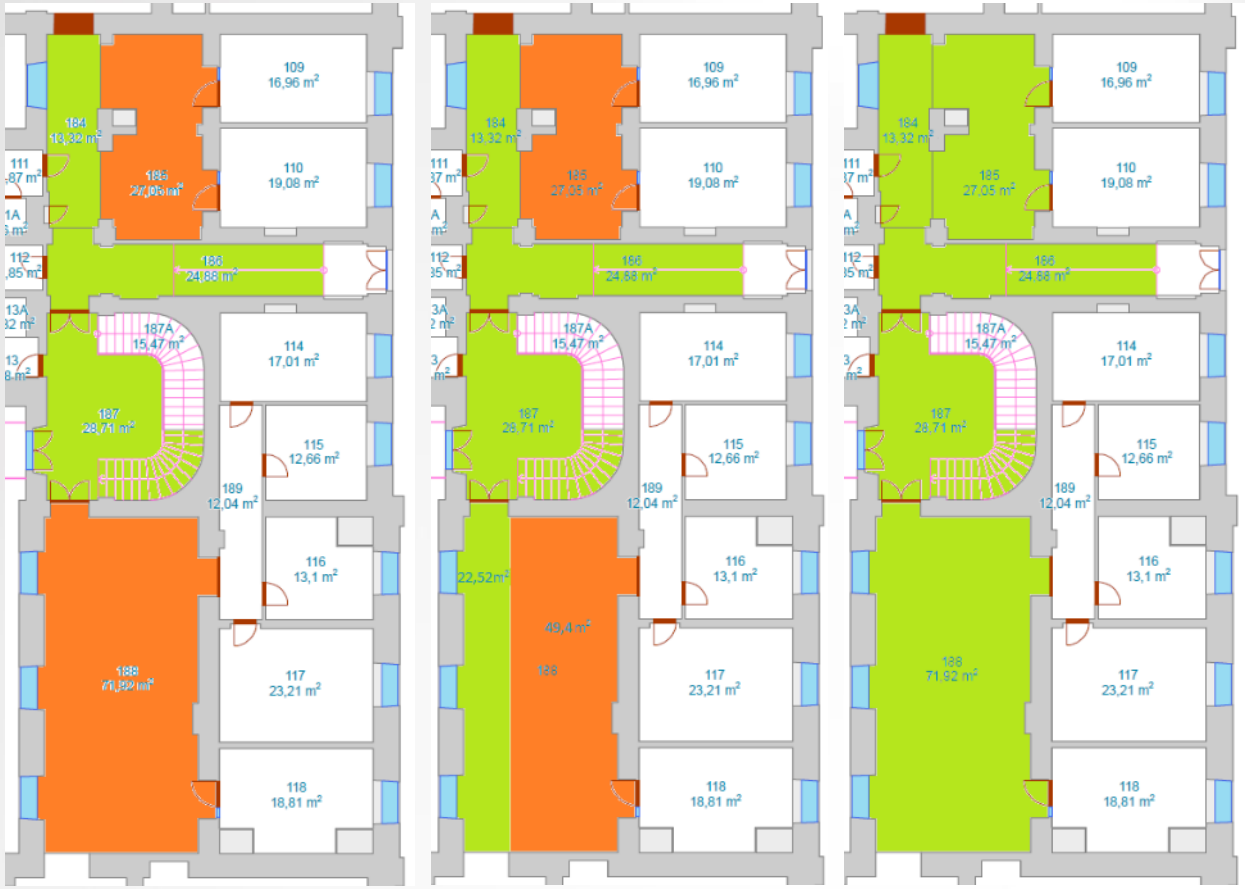
Key values



Ing. arch. Zdeněk Rudovský, Ph.D.

MINISTRY OF EDUCATION
YOUTH AND SPORTS

Inaccuracies in measurement



Net usable floor area

Net floor area

Max difference in net usable area
100%

Max difference in net area
60%

Inaccuracies in metrics

A

B

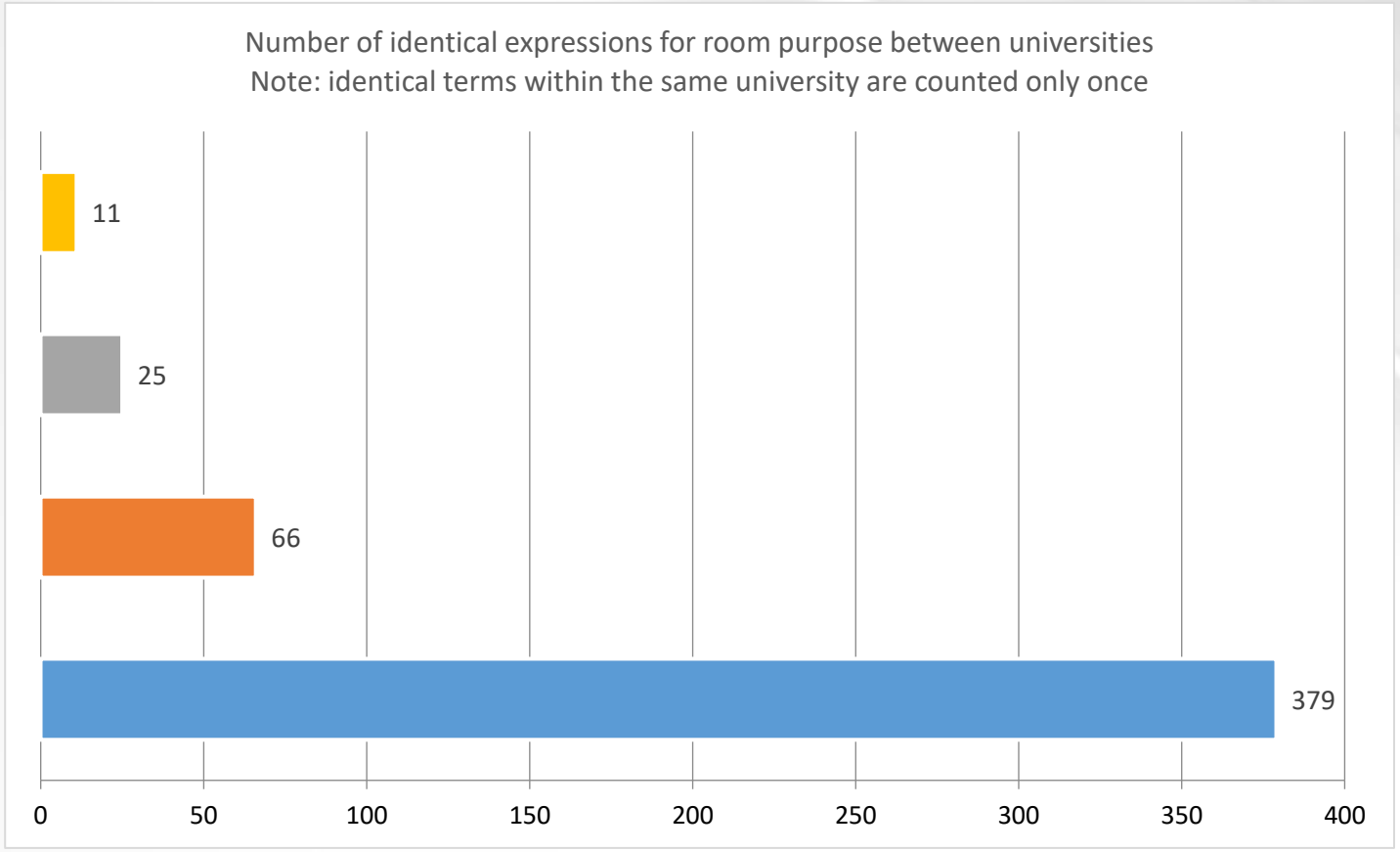
Example A (280,64 m^2)

Example B (303,25 m^2)

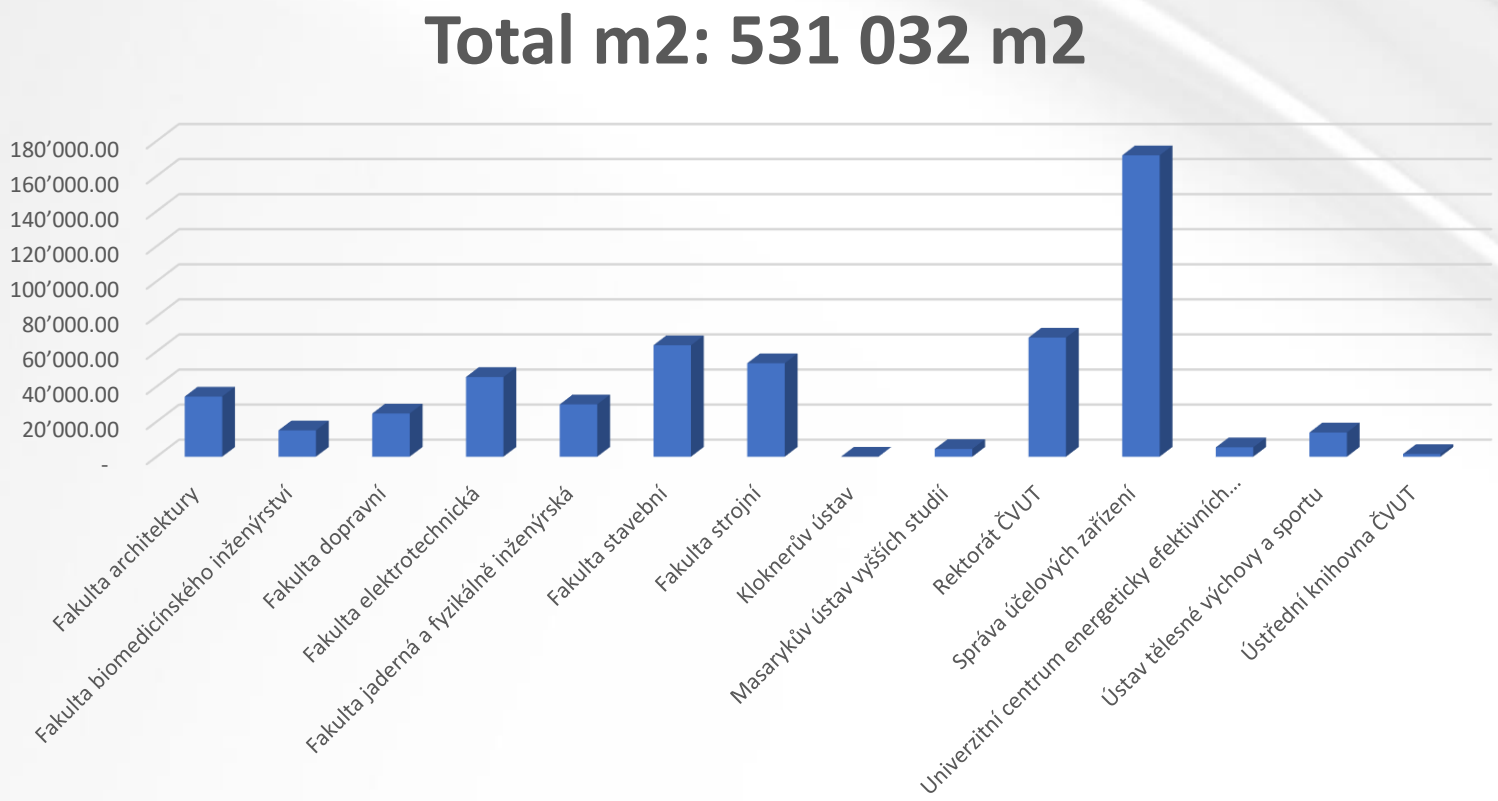
Difference

8,2%

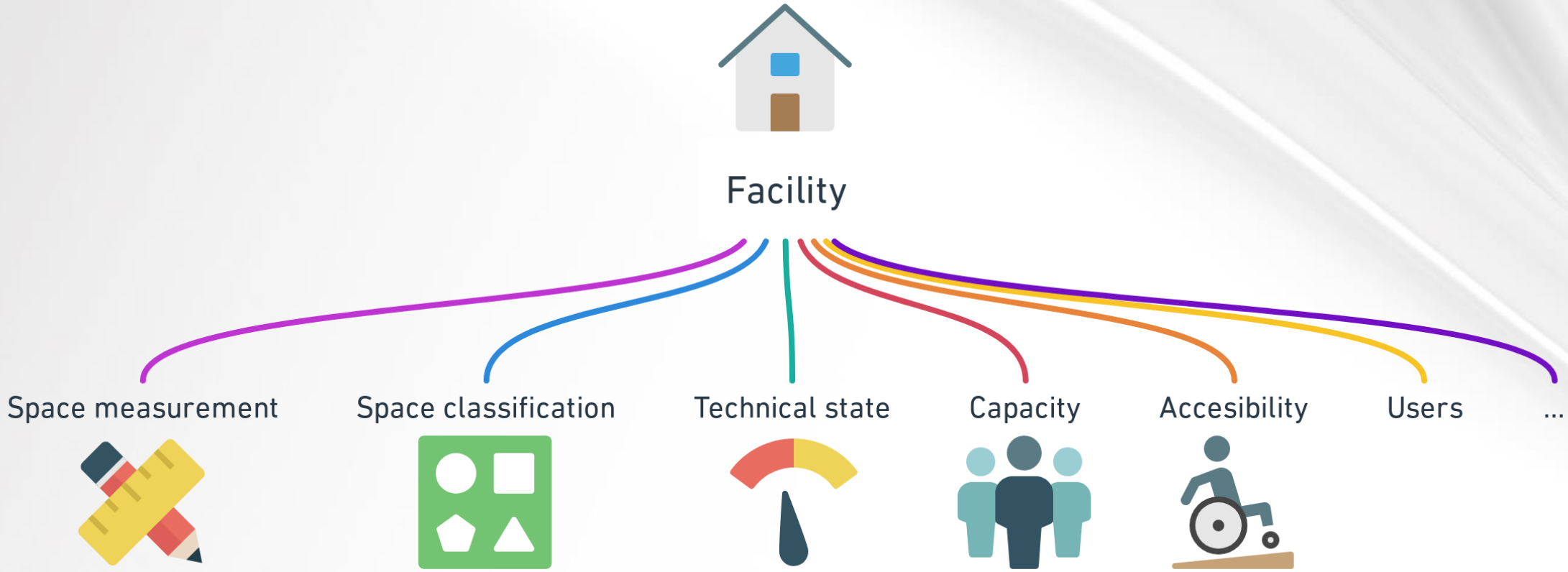
Inaccuracies in room naming/descriptions



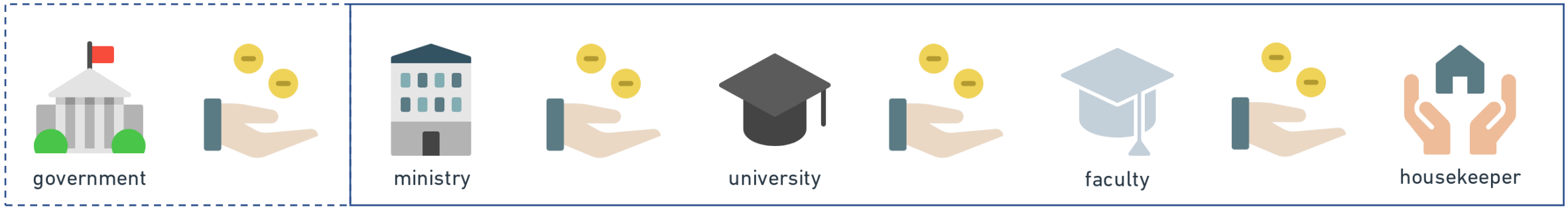
CTU in Prague – areas according to faculties



Areas addressed



Users addressed



Users adressed

Analyses

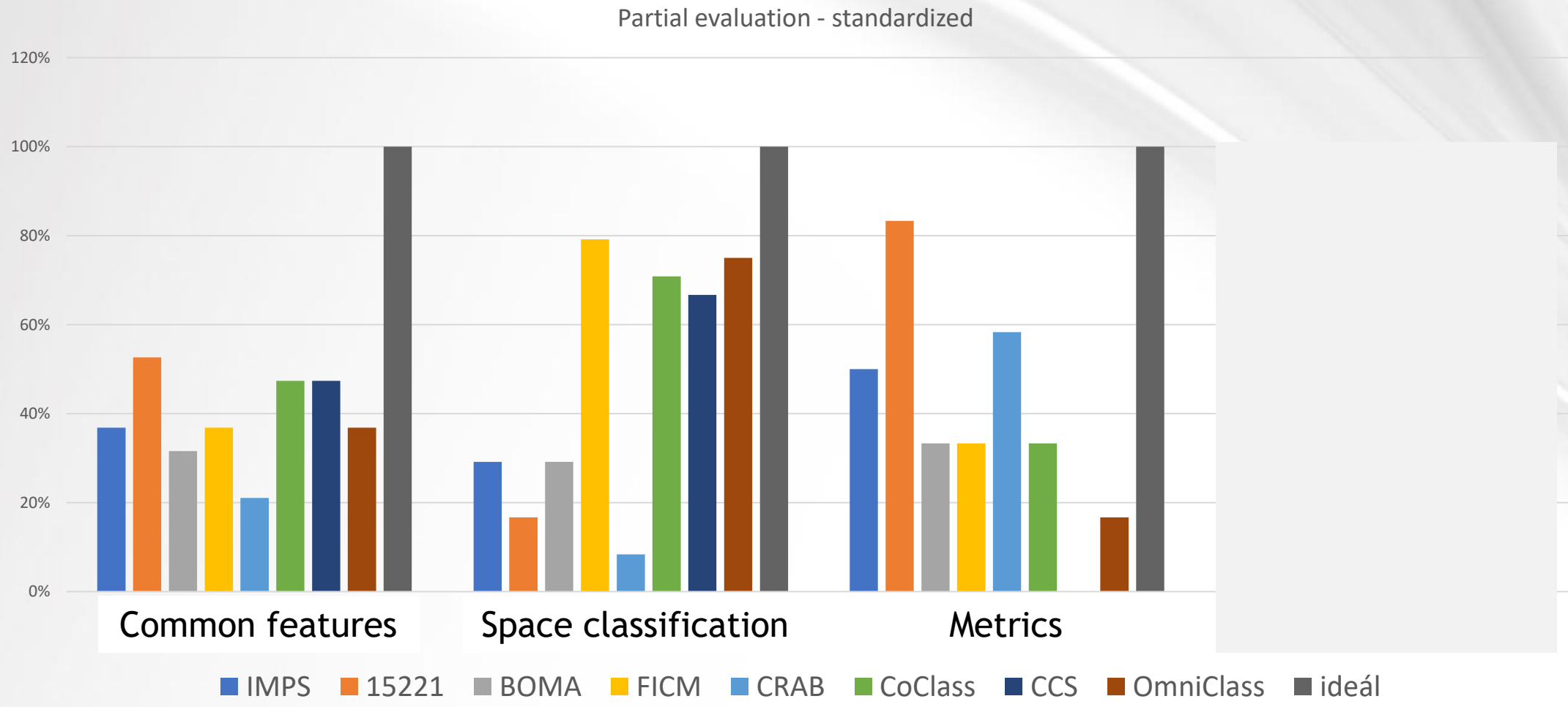
Analysis of existing methodologies for measuring and classifying spaces

Analysis of current portfolio technologies

Pre-selection of methodologies for assessment

Note: in Switzerland also the SIA 416 can be involved in assessment

Evaluation


Partial evaluation - standardized
120%
100%
80%
60%
40%
20%
0%
Common features
Space classification
Metrics
IMPS
15221
BOMA
FICM
CRAB
CoClass
CCS
OmniClass
ideál

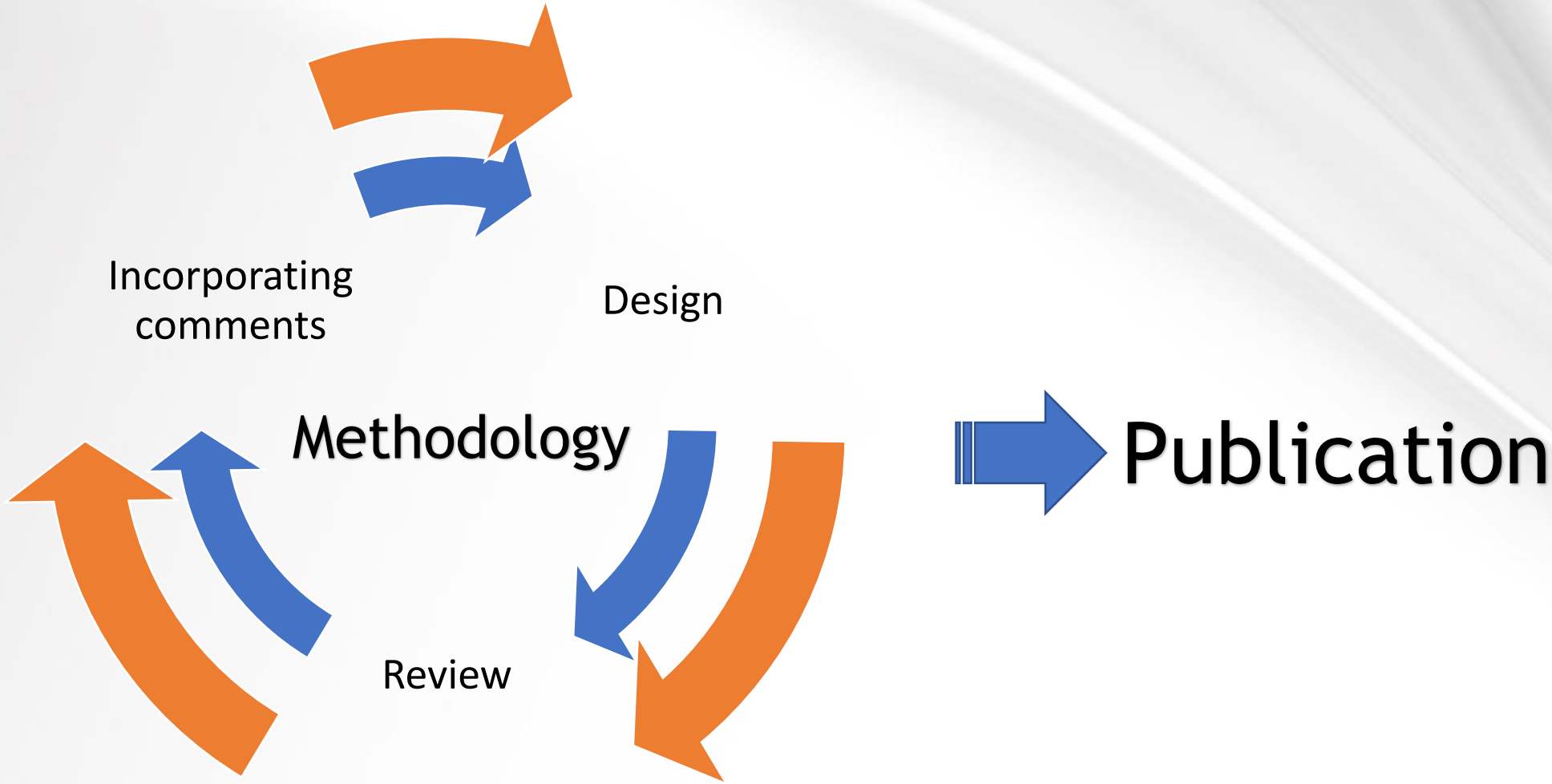
Real estate portfolio technology

A	B	C	D	E
				
Paper drawings	Excel sheets	Editable digital drawings	CAFM	CAFM + BIM

Standard development and implementation

implementation at universities in the Czech Republic

Implementation process



All universities consensus

Building condition assesment

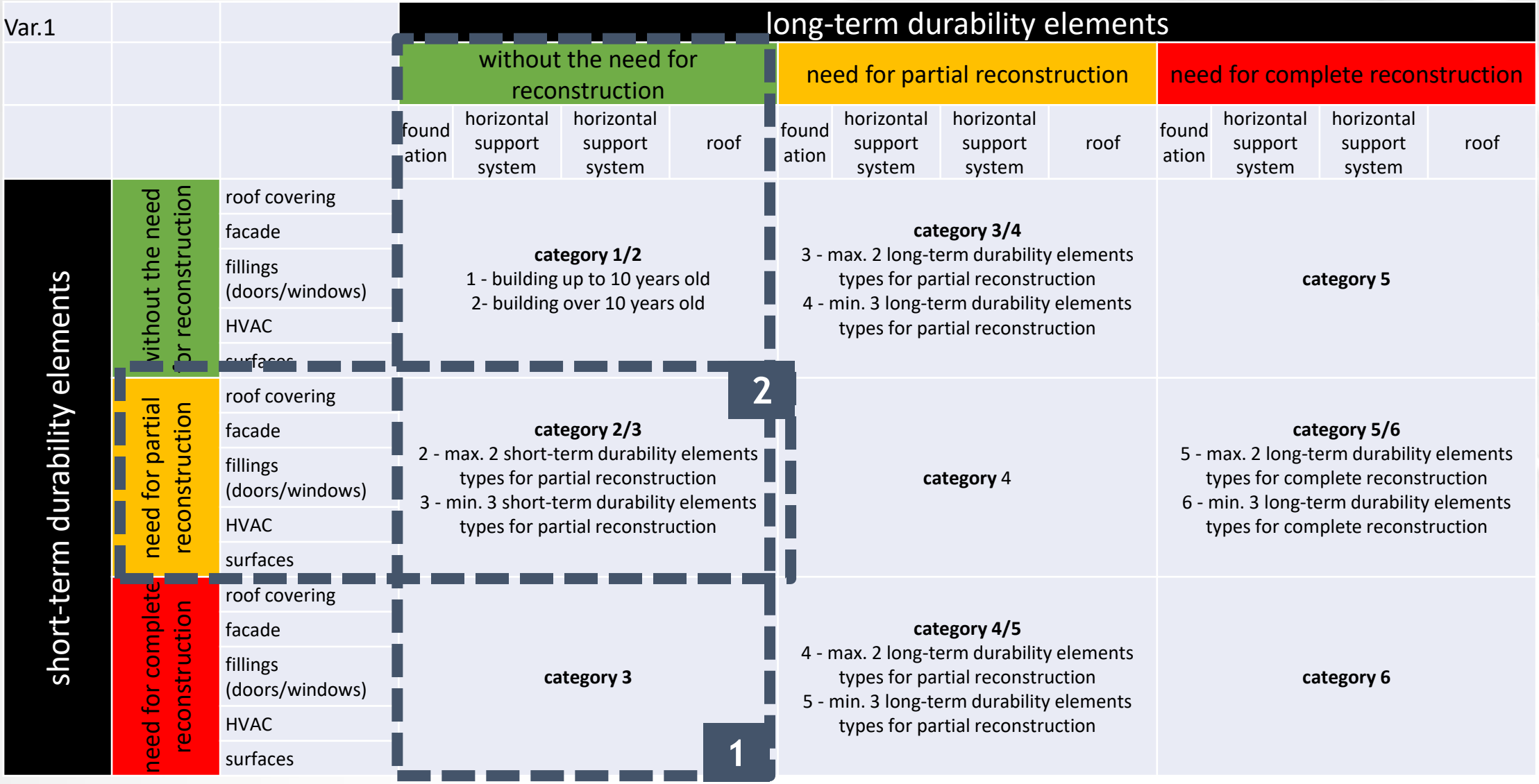
- More than 3000 building janitors on all universities
- Each year assesment
- Balance between:

simplicity and **precision**

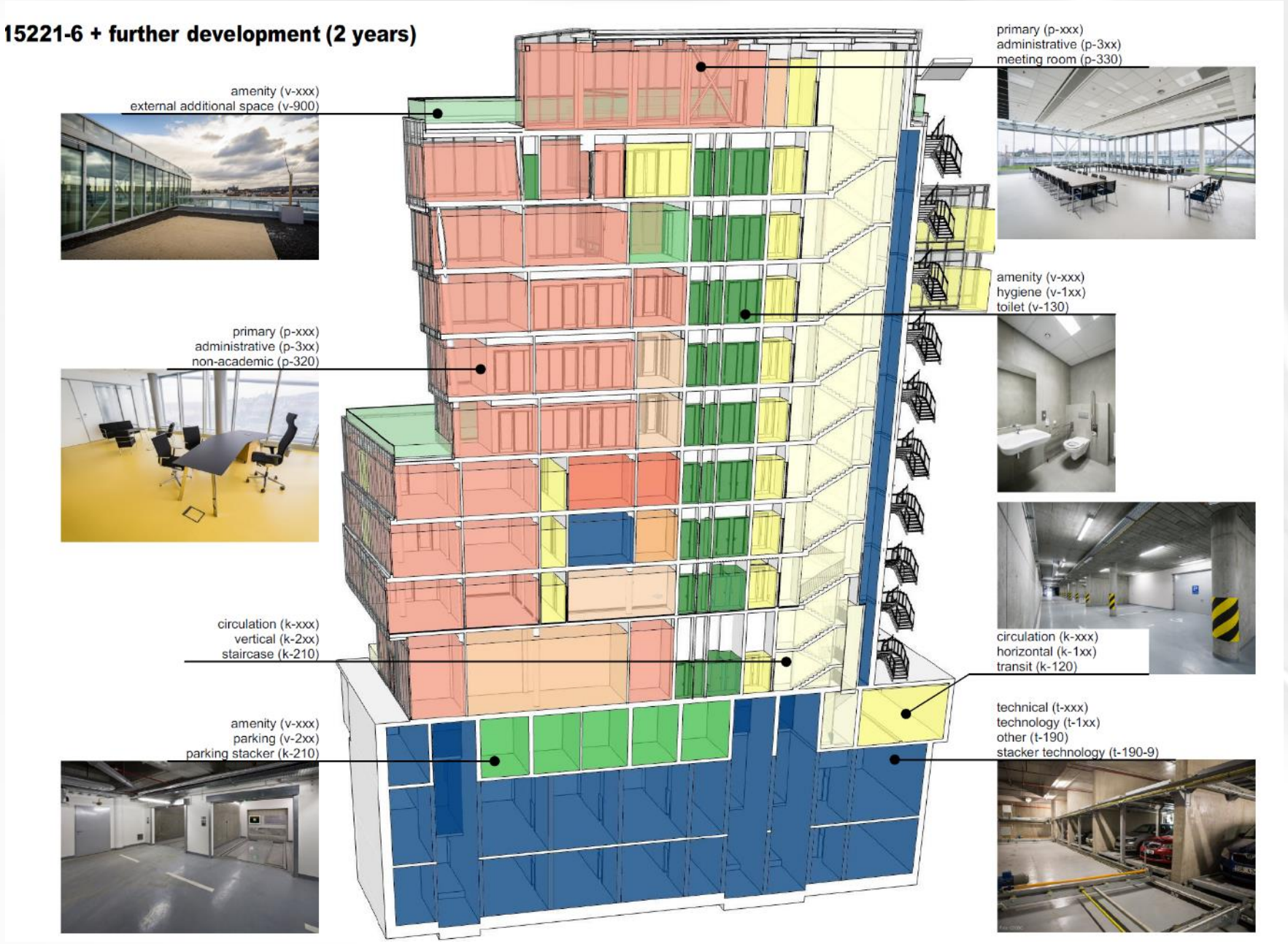
Building condition assessment

Var.1			long-term durability elements											
			without the need for reconstruction				need for partial reconstruction				need for complete reconstruction			
			foundation	horizontal support system	horizontal support system	roof	foundation	horizontal support system	horizontal support system	roof	foundation	horizontal support system	horizontal support system	roof
short-term durability elements	without the need for reconstruction	roof covering	**category 1/2** 1 - building up to 10 years old 2- building over 10 years old				**category 3/4** 3 - max. 2 long-term durability elements types for partial reconstruction 4 - min. 3 long-term durability elements types for partial reconstruction				**category 5**			
		facade												
		fillings (doors/windows)												
		HVAC												
		surfaces												
	need for partial reconstruction	roof covering	**category 2/3** 2 - max. 2 short-term durability elements types for partial reconstruction 3 - min. 3 short-term durability elements types for partial reconstruction				**category** 4				**category 5/6** 5 - max. 2 long-term durability elements types for complete reconstruction 6 - min. 3 long-term durability elements types for complete reconstruction			
		facade												
		fillings (doors/windows)												
		HVAC												
		surfaces												
	need for complete reconstruction	roof covering	**category 3**				**category 4/5** 4 - max. 2 long-term durability elements types for partial reconstruction 5 - min. 3 long-term durability elements types for partial reconstruction				**category 6**			
		facade												
		fillings (doors/windows)												
		HVAC												
		surfaces												

Building condition assessment



Space classification



Space classification

Code:

p-210

Name:

teaching laboratory

Definition:

Teaching laboratories are specialized spaces used primarily for regularly scheduled teaching, used for activities that are linked to a specific topic or scientific discipline. Planned teaching typically means regularly repeated lessons according to schedules, regular courses, etc.

Description:

Laboratories are characterized by a special purpose (equipment, surfaces, conditions) or a specific arrangement (disposition, configuration or mutual arrangement) of the space, which limit the teaching activity to a certain discipline or a closely related group of disciplines. These activities can be individual or group in nature, supervised or unsupervised. Teaching laboratories can further be divided into six basic categories according to the FORD classification - Fields of Research and Development - Structure of scientific fields according to OECD (Organization for Economic Co-operation and Development) http://www.vyzkum.cz/storage/att/E6EF7938F0E854BAE520AC119FB22E8D/Prevodnik_oboru_Frascati.pdf

is recorded **The capacity** .

Limitations:

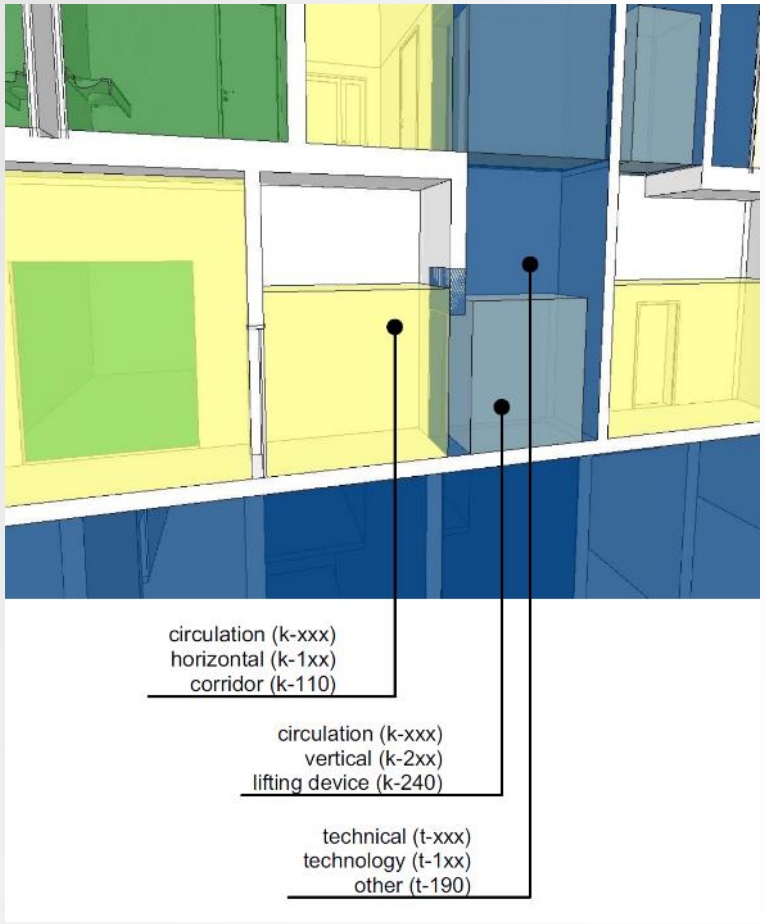
These are not teaching spaces (p-100) , the use of which is not tied to a specific topic or scientific discipline. These are not R&D laboratories (p-220) , in which research and development activities mostly take place.

Synonyms:

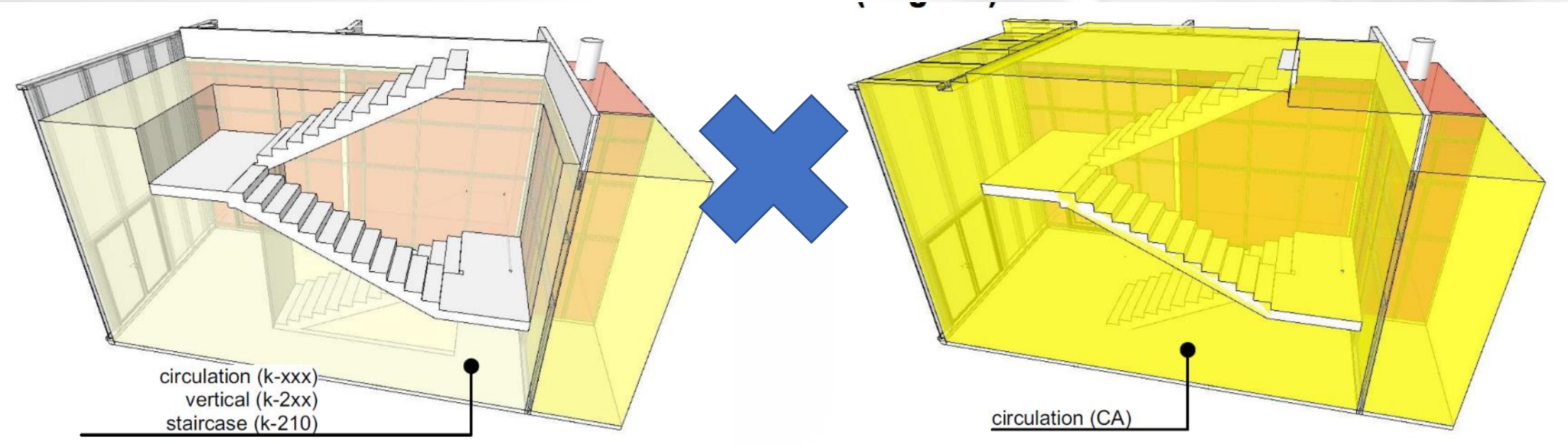
study, laboratory, laboratory, workshop

Examples:

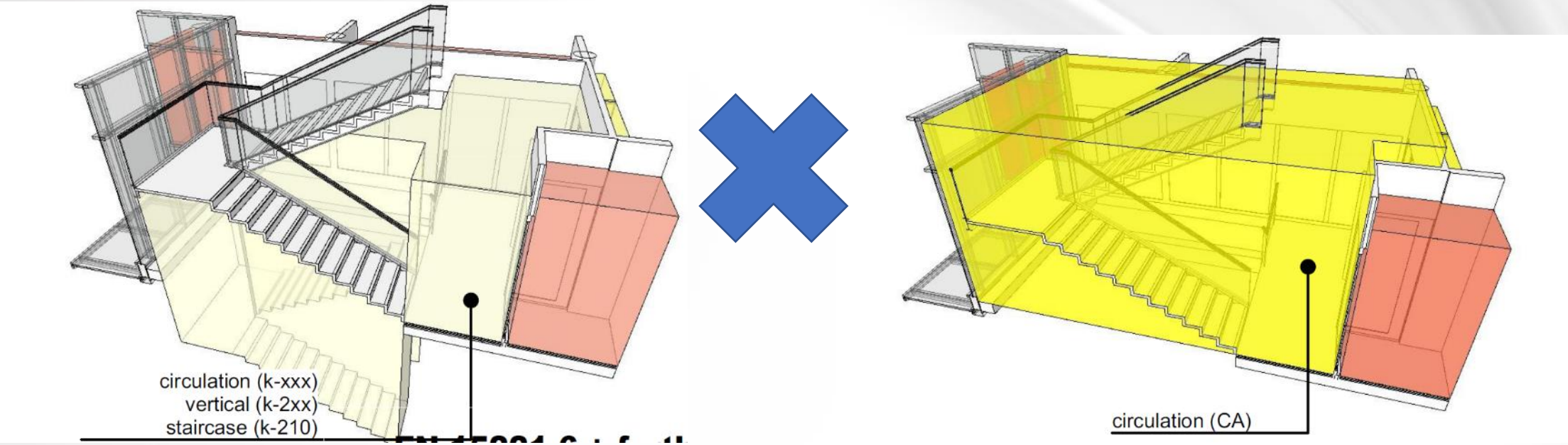
Space measurement I – elevator vs shaft



Space measurement II – staircase 1st floor



Space measurement II – staircase 2nd floor



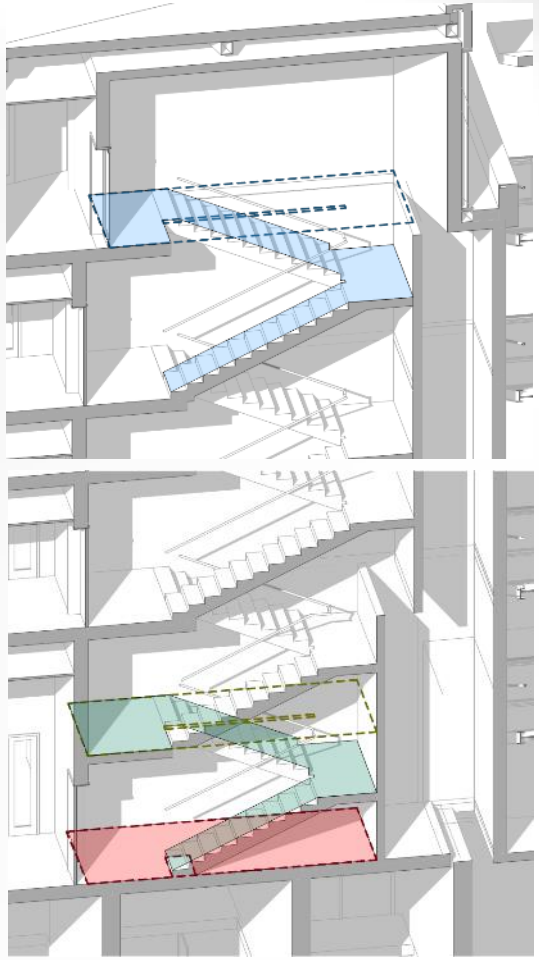
Staircase

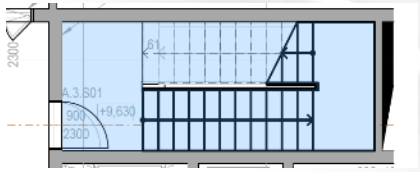
The area of the staircase is calculated as the projection of the staircase onto the horizontal surface.

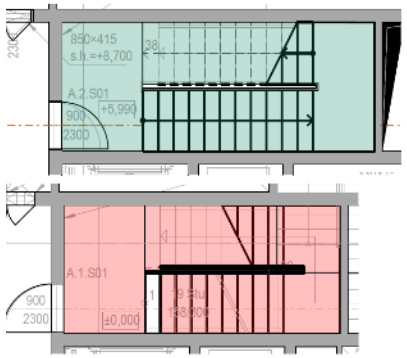
The area of the staircase underneath is added to the given level.

The area of the stair mirror is not included.

On the lowest floor, all floor area at floor level is counted.



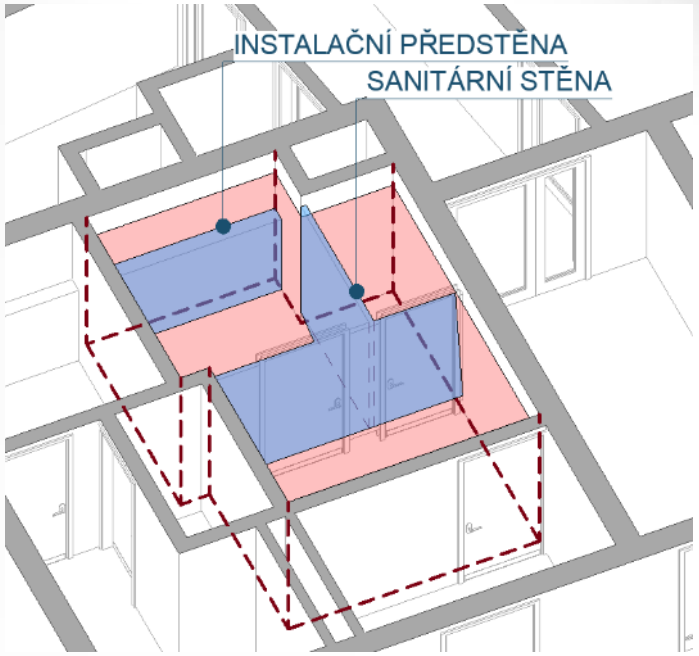


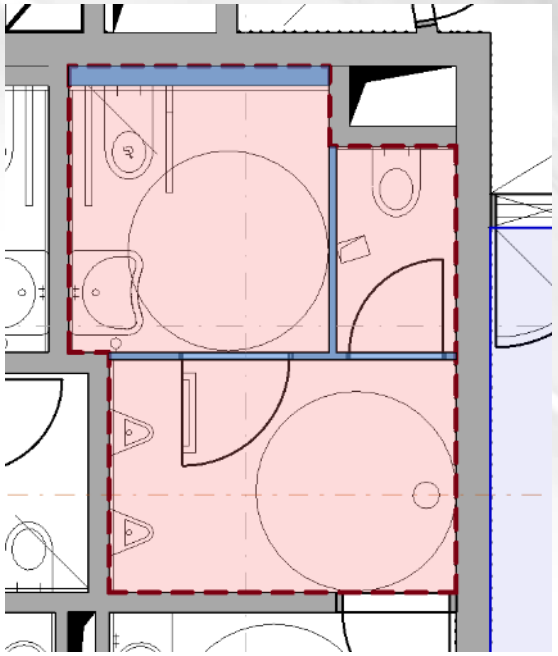


Sanitary area

Installation partitions up to a height of 1.2 meters count towards the floor area.

Sanitary walls (not over the full height of the room) count towards the floor area.





www.bim.cvut.cz/msmt

Call for further development

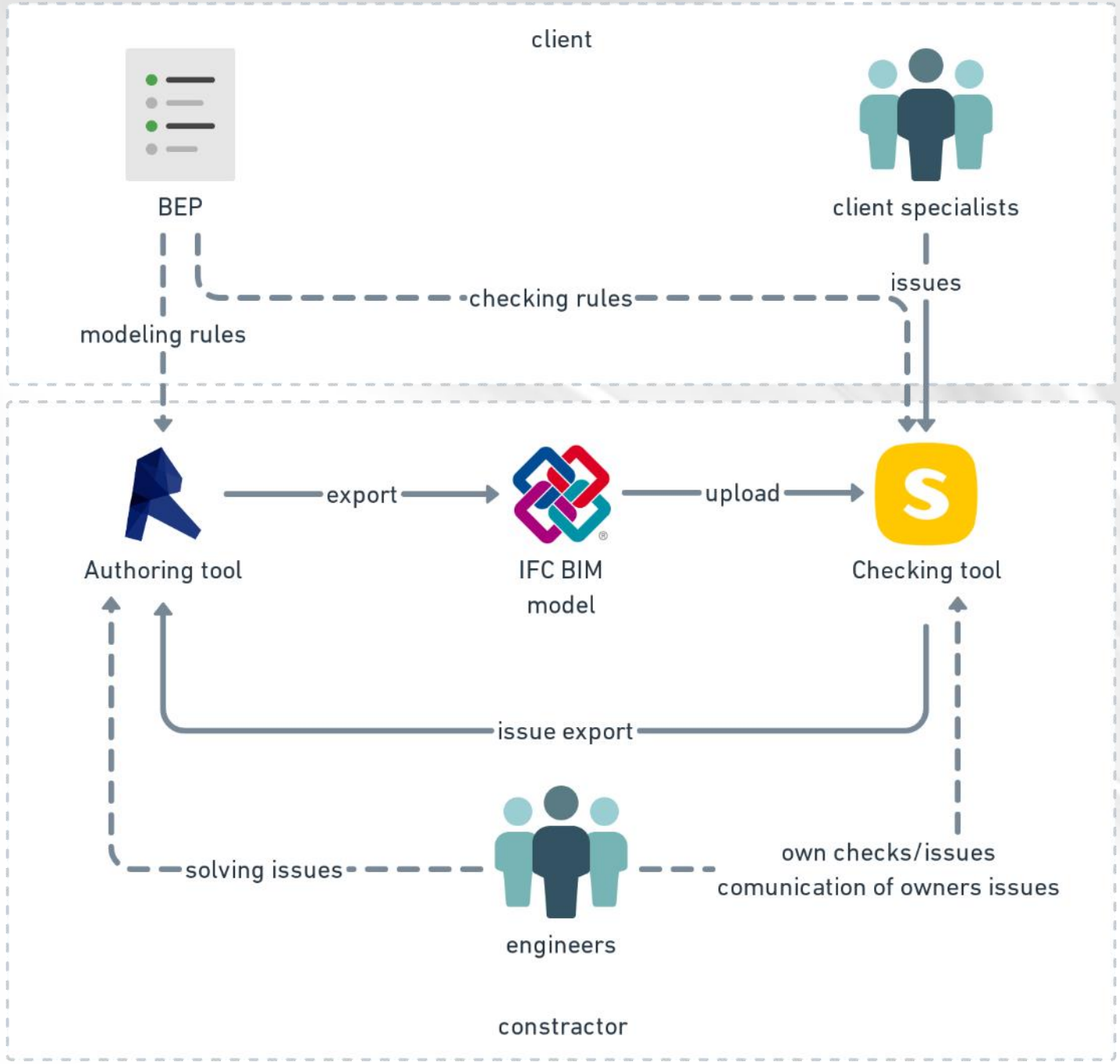
- Translate to other languages
- Adapt to other country norm
  - FM space benchmark accross universities

Standard implementation example
BIM project
Campus Albertov (325 mil. Euro)

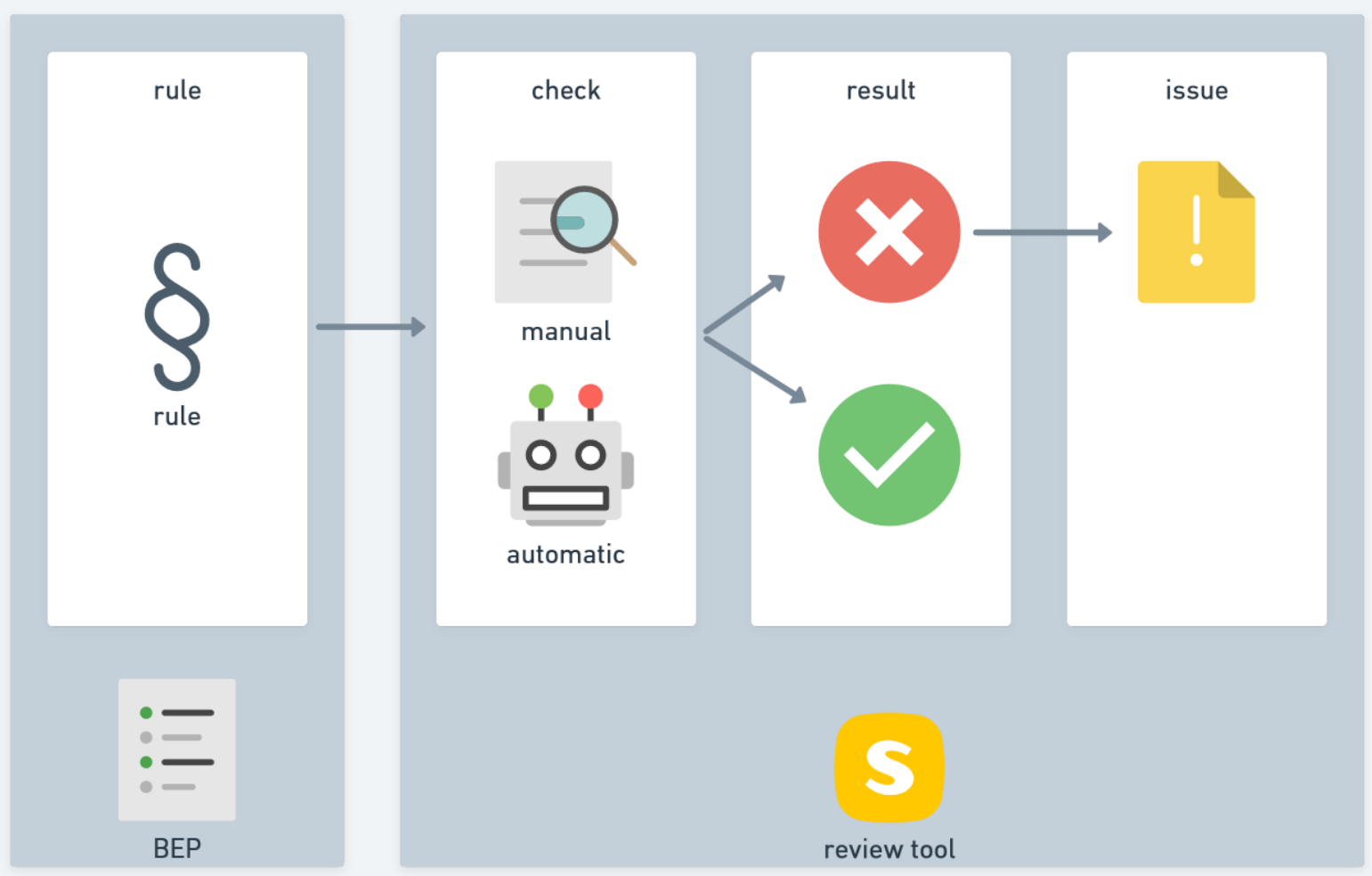
Need of..

- Consistent and fast space QTO
- Clear classified spaces according the Standards

QC/AC process



Rules (BEP) vs check in the tools (smc)



Check of project information

Manual 2D

Manual 3D

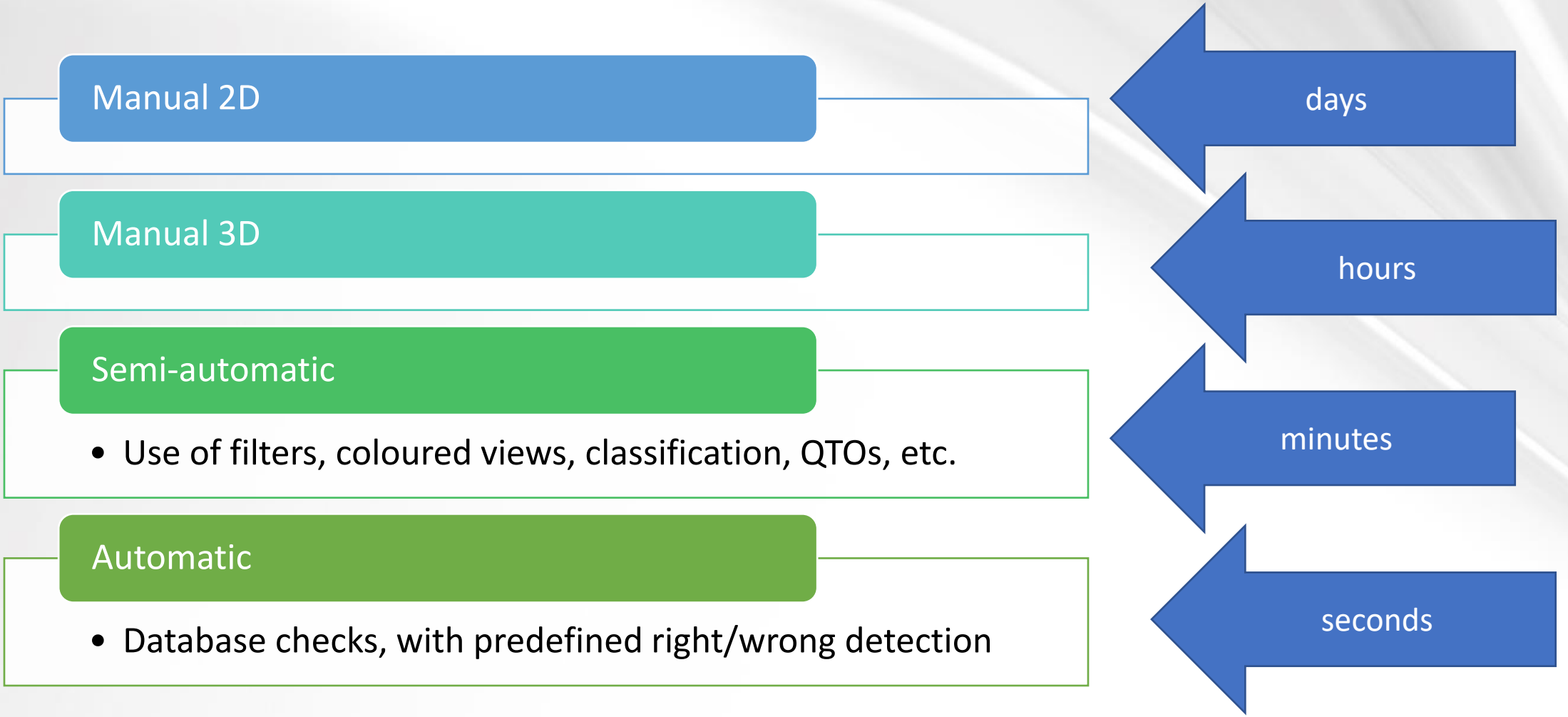
Semi-automatic

- Use of filters, coloured views, classification, QTOs, etc.

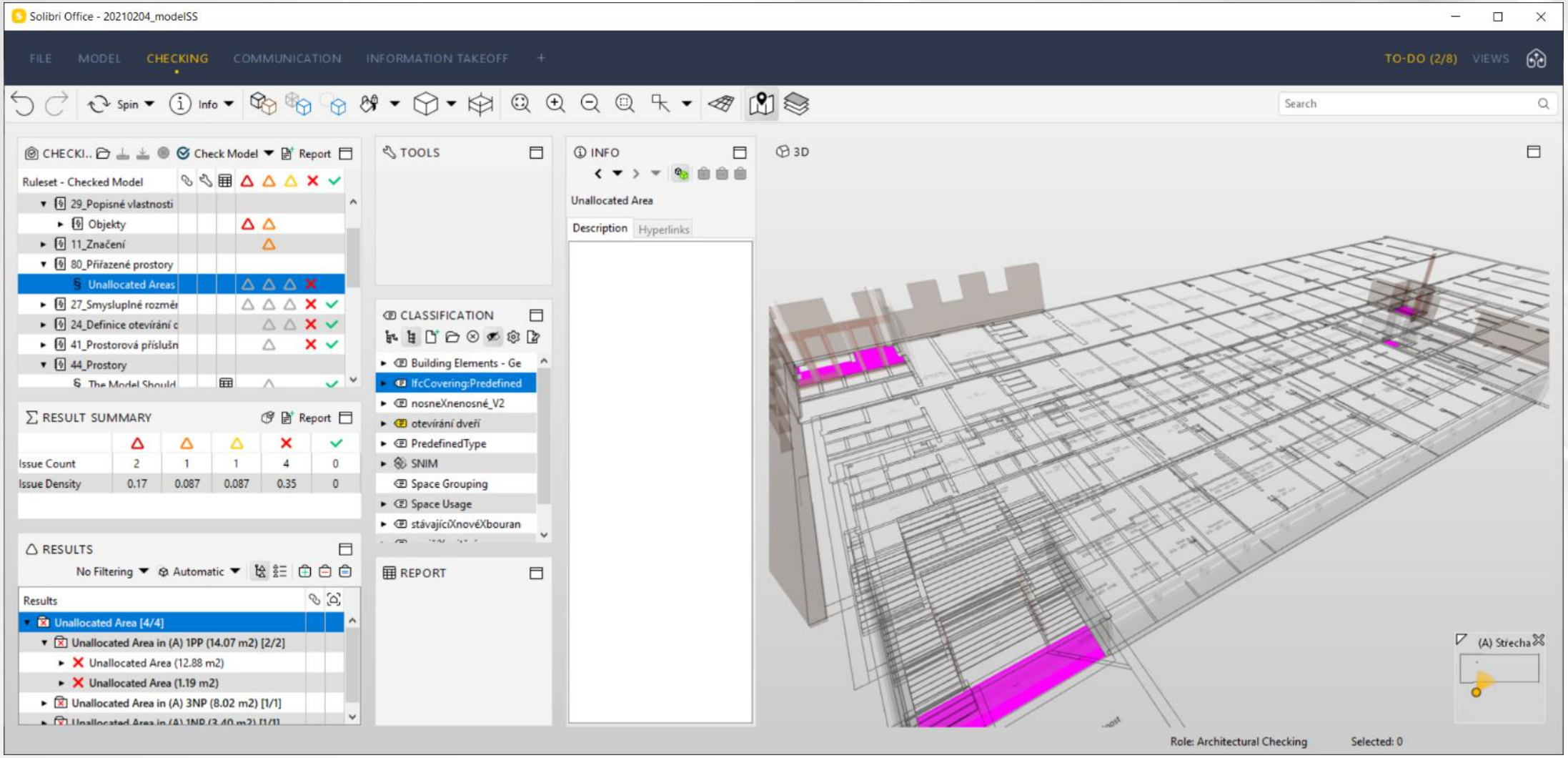
Automatic

- Database checks, with predefined right/wrong detection

Check of project information



Example of automatic check



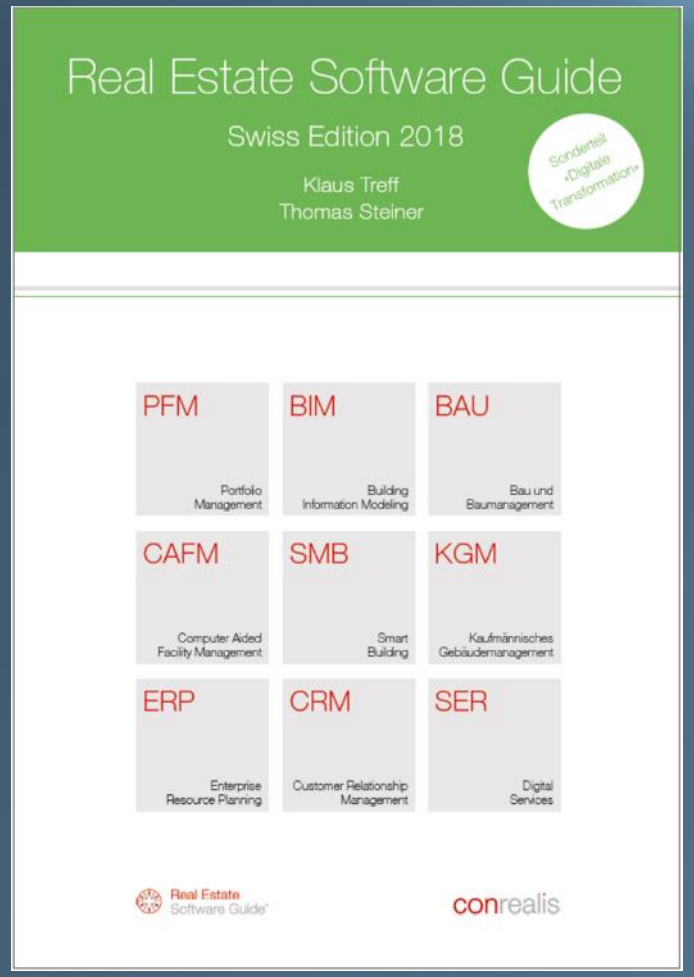
Example of poloautomatic checks

findCAFM.com

Tool to find the best fit CAFM solution

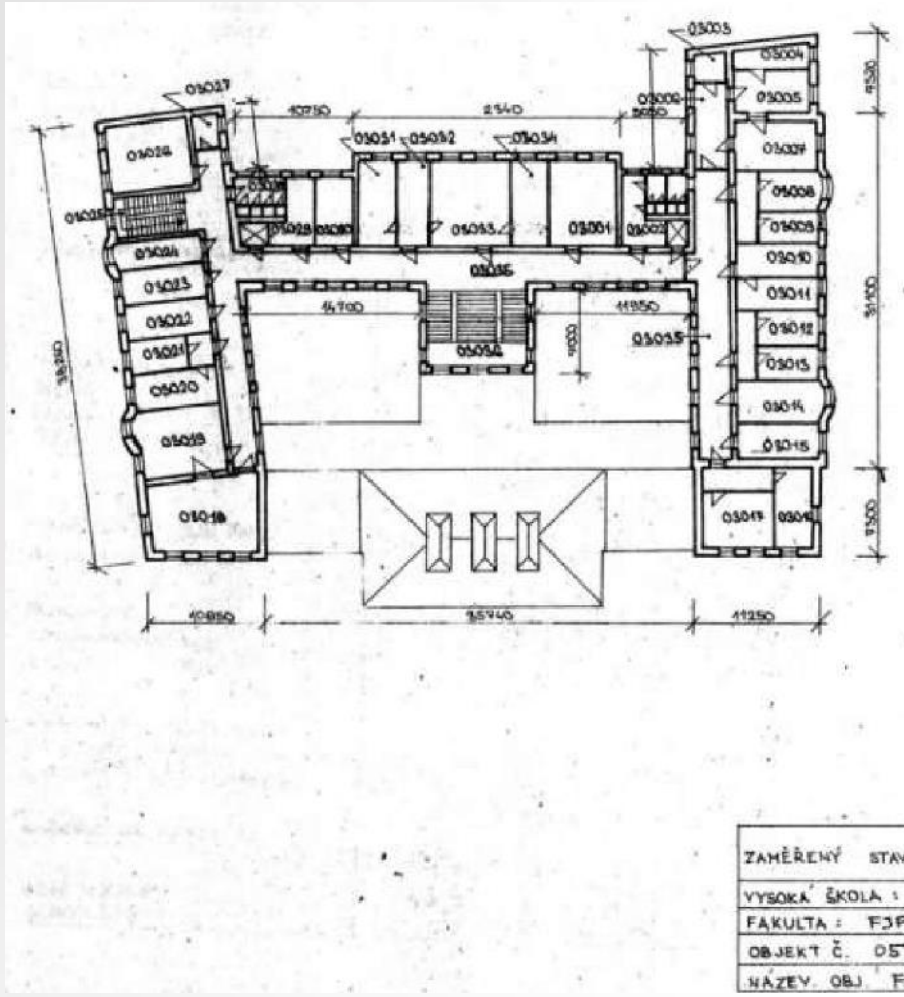
Assesment of cca 400 CAFM features

Cca 10 hours of features checking/per CAFM -> recorded for further confirmation


Real Estate Software Guide
Swiss Edition 2018
Sonderteil «Digitale Transformation»
Klaus Treff
Thomas Steiner
PFM
Portfolio Management
BIM
Building Information Modeling
BAU
Bau und Baumanagement
CAFM
Computer Aided Facility Management
SMB
Smart Building
KGM
Kaufmännisches Gebäudemanagement
ERP
Enterprise Resource Planning
CRM
Customer Relationship Management
SER
Digital Services
Real Estate Software Guide
conrealis


Der Facility Manager
alpha inside consultants
GEFMA
German Facility Management Association
Marktübersicht CAFM-Software
2022
GEFMA 940
Implementierung und Datenerfassung
NEWS

Need for proper tool



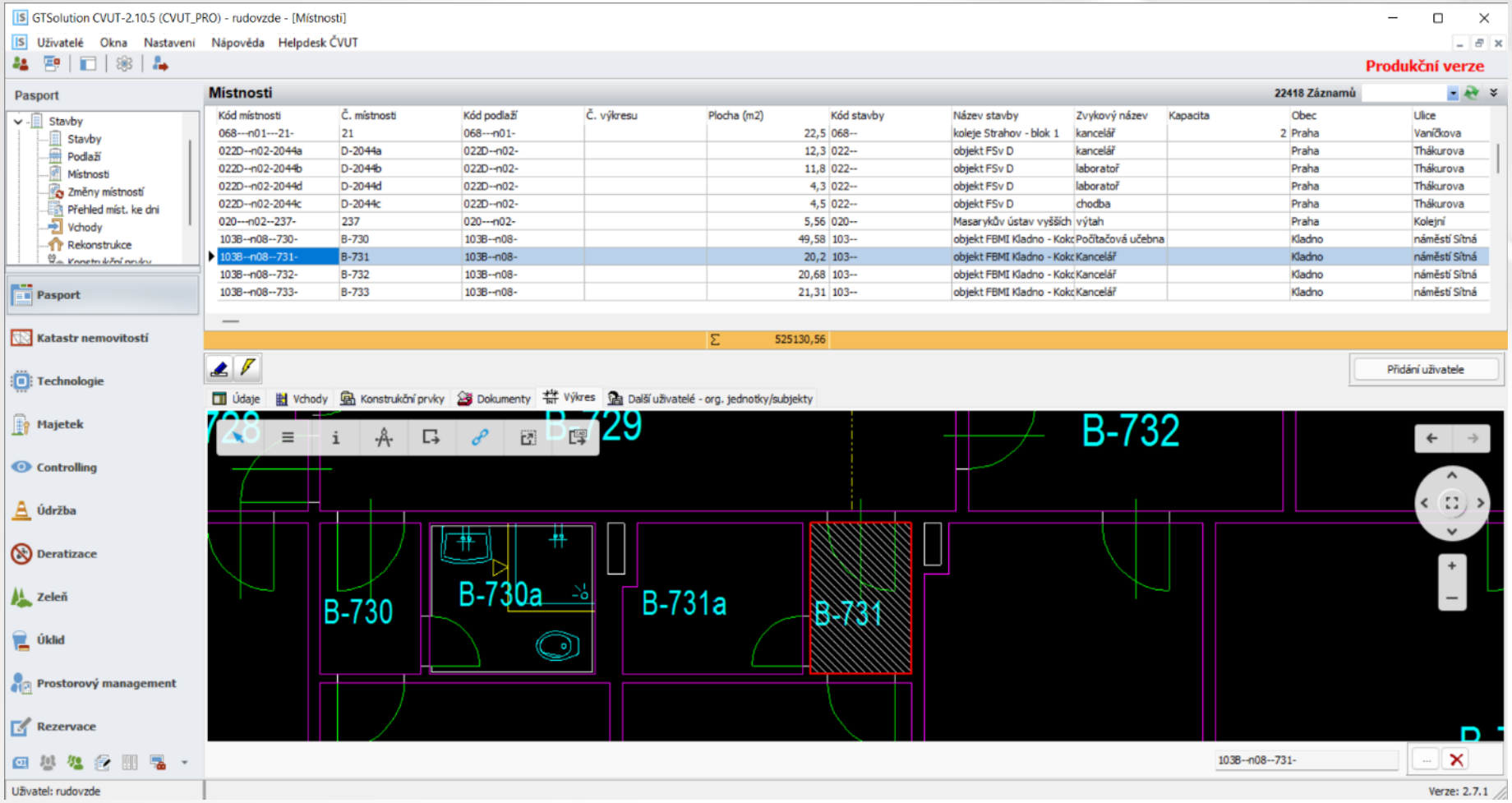
1. Místnost č.	2. Název místnosti 2. NADZEMNÍ PODLAŽÍ	3. Plocha v m²	4. Sv. v. m	5. UFS	Funkční soubor 6.ZFS	7.PFS	8.FSK	9.FSTV	Kapacita 10. Kód	Uživatel 11. Kód	Využití 12. Kód	Už. ch	Stáv. - ný druh 13	14.
02001	LABORATOŘ KAT. FYZIKY	42,20	4,30							03332144			3	
02002	KANCELÁŘ ASIS" CF	8,00	4,30							03332144			3	
02003	LABORATOŘ CF	9,20	4,30							03332144			3	
02004	SCHODIŠTĚ	18,27	4,30							03332144			2	
02005	KANCELÁŘE + LABOR AS. KF	37,10	4,30							03332144			3	
02006	KANCELÁŘ AS KF	20,00	4,30							03332144			3	
02007	KANCELÁŘ AS CF	18,00	4,30							03332144			3	
02008	LABORATOŘ CF	18,00	4,30							03332144			3	
02009	LABORATOŘ CF	35,50	4,30							03332144			3	
02010	LABORATOŘ CF	62,40	4,30							03332144			3	
02011	LABORATOŘ CF	50,25	4,30							03332144			3	
02012	POSLUCHÁRNA	165,00	4,30							03332144			3	
02013	POKLADNA	20,00	4,30							03332144			3	
02014	ÚČTÁRNA	29,40	4,30							03332144			3	
02015	ODDĚL. VĚDY A VÝZK. - KANC.	24,20	4,30							03332144			3	
02016	KANCELÁŘE TAJEMNÍK FAK.	44,85	4,30							03332144			3	
02017	KANCELÁŘE SEKRET.	25,10	4,30							03332144			3	
02018	KANCELÁŘE "ADMINISTRATIVA FAK.	20,75	4,30							03332144			3	
02019	HOSPOD. ODDĚL. - KANCEL.	16,00	4,30							03332144			3	
02020	HOSPOD. ODDĚL. - KANCEL.	16,00	4,30							03332144			3	
02021	PŘEDSÍŇ	7,60	4,30							03332144			3	
02022	ÚČTÁRNA	19,10	4,30							03332144			3	
02023	KANCEL. OBOR. ODDĚL.	19,10	4,30							03332144			3	
02024	ZASEDACÍ MÍSTNOST	66,00	4,30							03332144			3	
02025	STUDIJNÍ ODDĚLENÍ	43,20	4,30							03332144			3	
02026	STUDIJNÍ ODDĚLENÍ	104,00	4,30							03332144			3	
02027	WC	28,80	4,30							03332144			3	
02028	POSLUCHÁRNA	40,00	4,30							03332144			3	
02029	POSLUCHÁRNA	61,10	4,30							03332144			3	
02030	KÁDROVÉ A PERS. ODDĚL.	19,50	4,30							03332144			3	
02031	KÁDROVÉ A PERS. ODDĚL.	19,50	4,30							03332144			2	
02032	ZVLÁŠTNÍ ODDĚLENÍ	16,00	4,30							03332144			3	
02033	DÍLNA - KAT. FYZIKY	16,50	4,30							03332144			3	
02034	WC	28,80	4,30							03332144			3	
02035	CHODBA	544,73	4,30							03332144			3	
	CELKEM	1704,65												

31 01 04 05

31 01 04 05

ZAMĚŘENÝ STAV	VYPRACOVAL KODAT		DATUM 12/87
	ZAMĚŘIL	MĚŘÍTKO 1:400	FORMÁT 2A4
VYSOKÁ ŠKOLA : ČVUT	STŘEDISKO 31 - PRAHA		CENTRUM 01 PRAHA
FAKULTA : FJFI	AREÁL : 04 - JOSEFOV		ZÁK. Č. 8004/11
OBJEKT Č. 05	KAT. ÚZEMÍ		PARC. Č.
NÁZEV OBJ. F4 - BŘEHOVÁ	OBSAH 3. NADZEM. PODL.		

Need for proper tool



findCAFM – benchmark of CAFM solutions

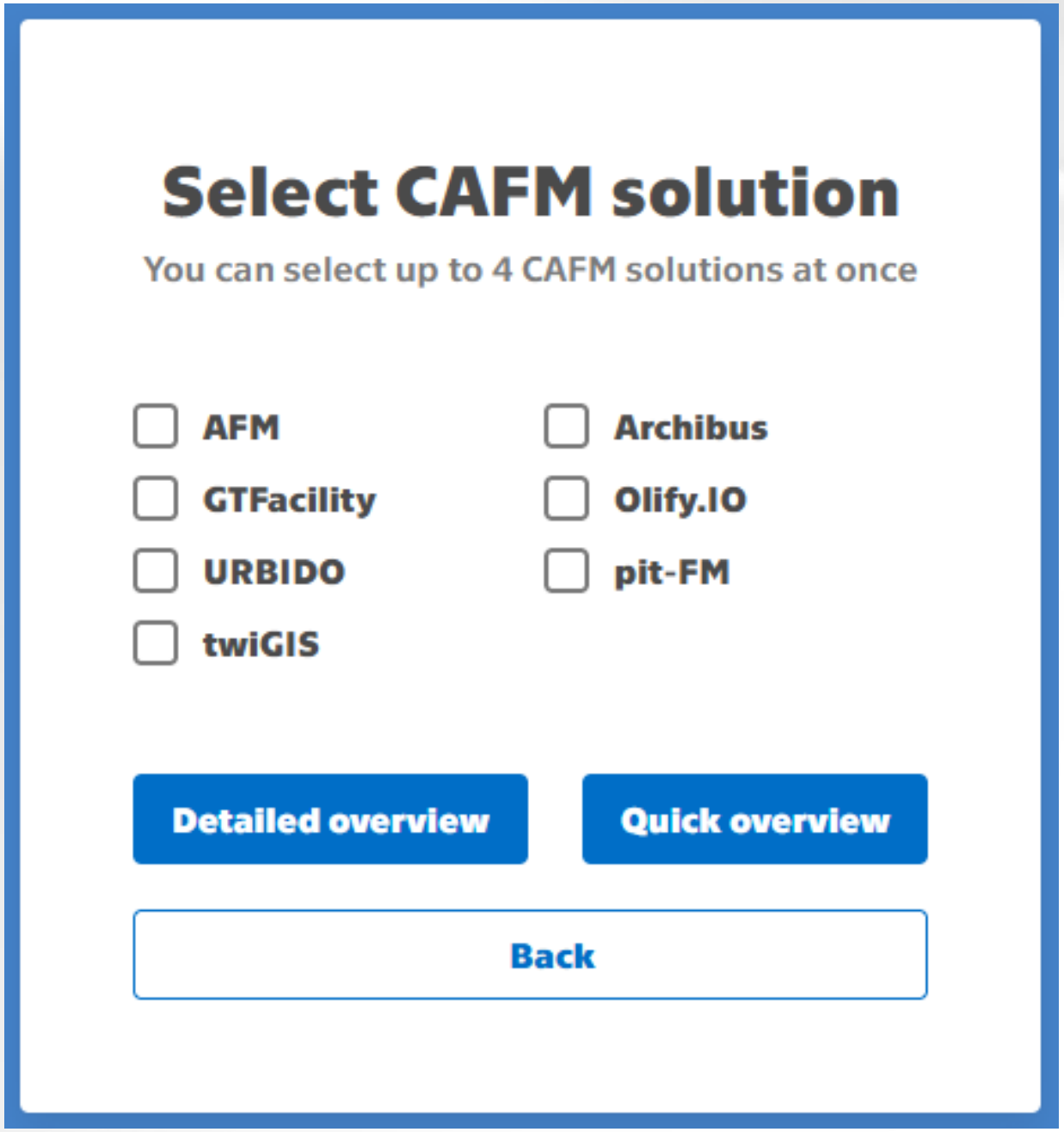
OVERVIEW AND COMPARISON OF CAFM SYSTEM FUNCTIONALITIES

The project presents an overview of functionalities and a comparison of the properties of individual CAFM systems. The database has thematically sorted queries about whether a given CAFM system includes the relevant feature or functionality. The database also contains descriptive characteristics that specify the possibilities of implementing CAFM systems. For the objectivity of the review, we verified all data.

FIND CAFM

INFORMATION ABOUT CAFM

ABOUT THE PROJECT



the more solutions are comming

Scope of benchmark – features in the fileds

Records
System allows...

- General
- Properties
- Technology
- Documents

Graphics
System allows...

- BIM
- CAD
- GIS

Processes
System allows...

- General
- Operation and Maintenance
- Energy
- Car park
- Economic
- Contracts
- Other processes

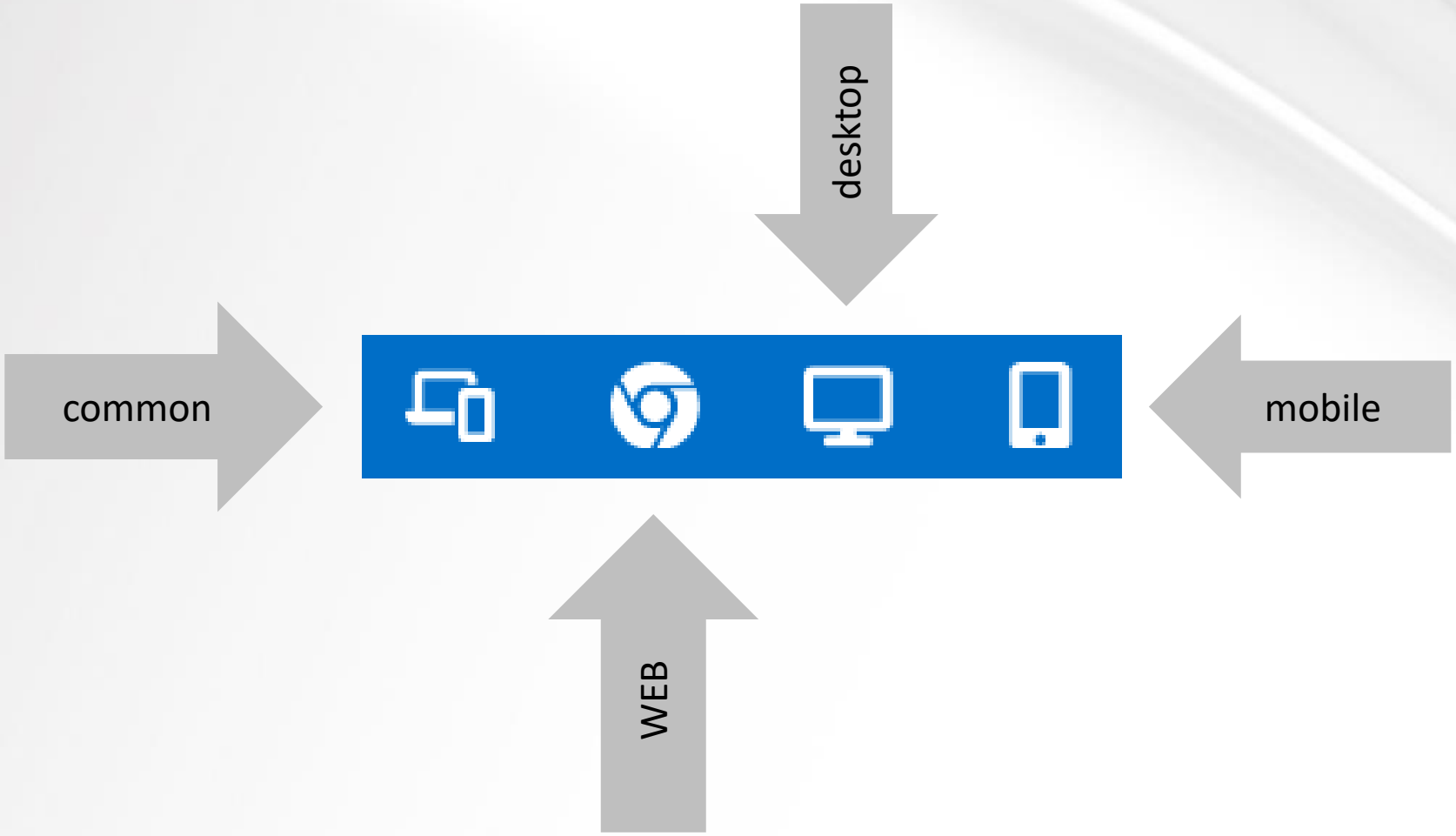
System
System allows...

- Workflow
- Environment
- Localization
- Notification
- Integration
- License
- Support

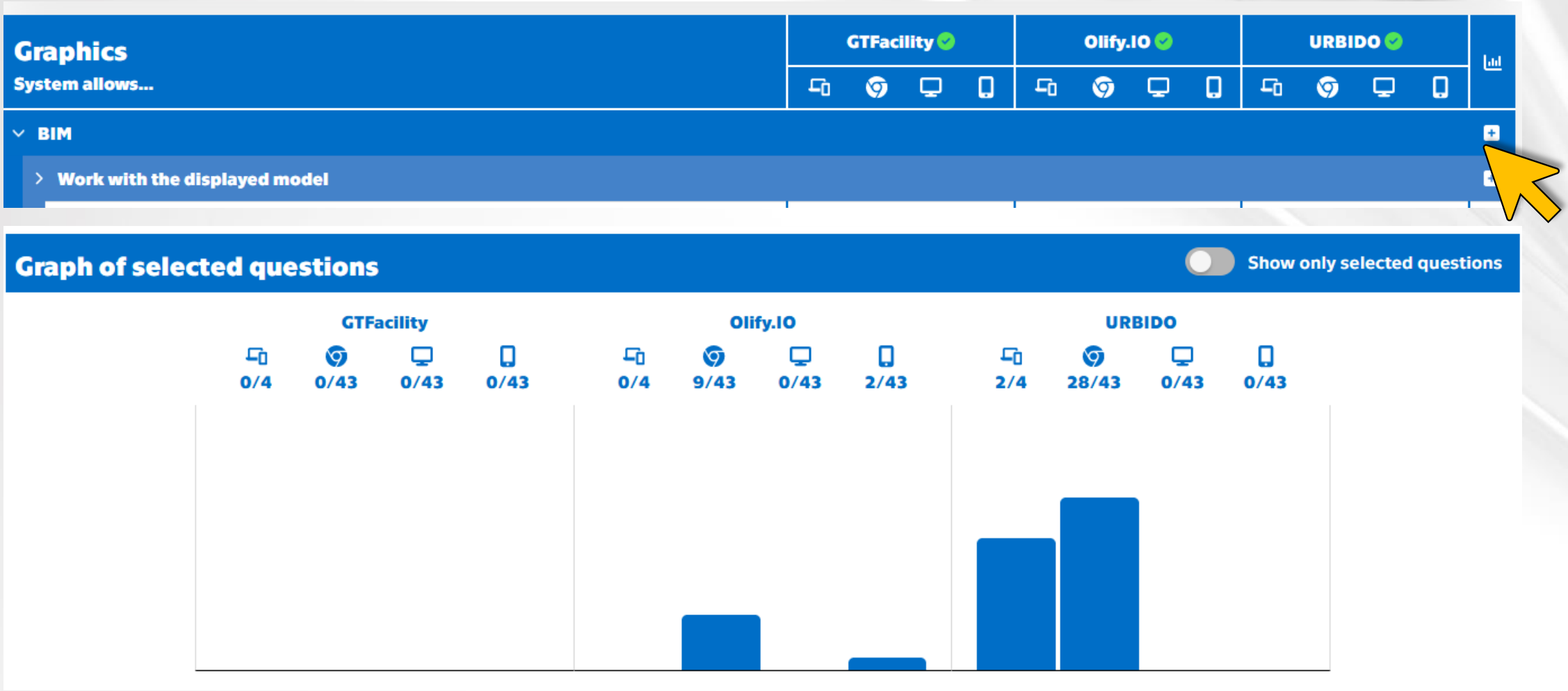
Benchmark table

Graphics System allows...	GTFacility				Olify.IO				URBIDO			
BIM												
Work with the displayed model												
IFC												
import of arbitrary objects from IFC to CAFM	—	✗	✗	✗	—	✓	✗	✗	—	✓	✗	✗
display of the tree structure of the project ('Spatial Structure' concept)	—	✗	✗	✗	—	✓	✗	✓	—	✓	✗	✗
display of all IFC properties ('Property Sets' concept)	—	✗	✗	✗	—	✓	✗	✓	—	✓	✗	✗
add or edit IFC properties and property groups incl. entry into the IFC model (the 'Property Sets' concept)	—	✗	✗	✗	—	✗	✗	✗	—	✗	✗	✗
display of links of elements to a group/system/zone ('Group Assignment' concept)	—	✗	✗	✗	—	✗	✗	✗	—	✓	✗	✗
display of elements according to project type ('Object Typing' concept)	—	✗	✗	✗	—	✗	✗	✗	—	✓	✗	✗
display of elements according to project type ('Classification' concept)	—	✗	✗	✗	—	✗	✗	✗	—	✓	✗	✗
display elements by layer (using IfcPresentationLayerAssignment data class)	—	✗	✗	✗	—	✗	✗	✗	—	✓	✗	✗
CAD												
General												
direct link to DWG/DXF without intermediate import/export to your own drawing format, for this:	✗	—	—	—	✓	—	—	—	✓	—	—	—
• use of DWF/DXF drawing elements for automated editing of data objects	—	✗	✗	✗	—	✓	✗	✓	—	✗	✗	✗
• writing non-graphical information into a DWG/DXF drawing	—	✗	✗	✗	—	✓	✗	✓	—	✓	✗	✗

Platform



Analytical tools



Call for further development

- Translate to other languages (now EN/CZ)
- Benchmark more CAFM solutions
- Turn to international benchmark -> ready to share licence

Pilot project BIM vs CAFM

- Olify.io
- Urbido.cz

what didn't fit in the FM section

- BIM -> design review during the BIM project CDE vs Check tools
- BIM design analyses
- common

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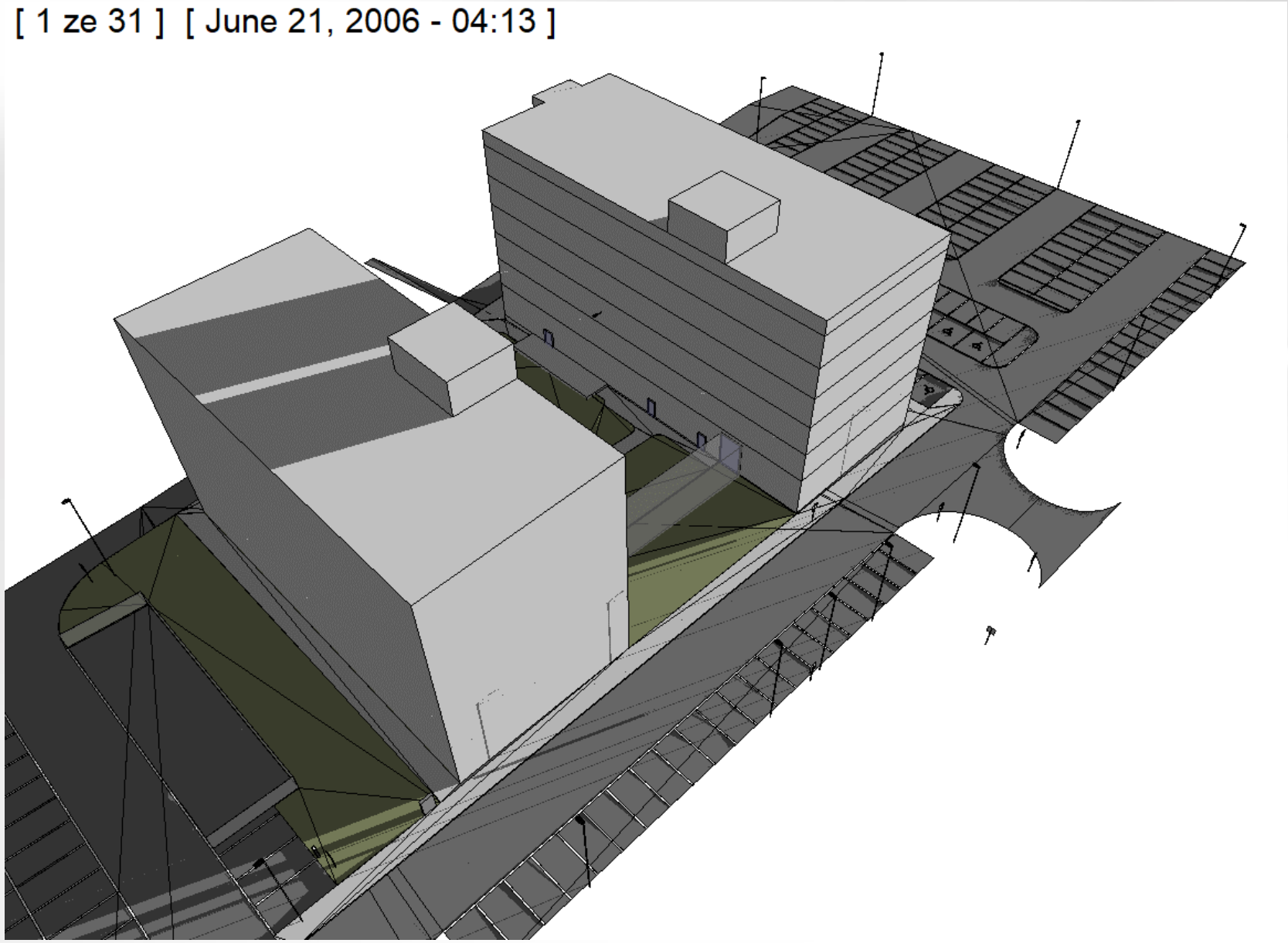

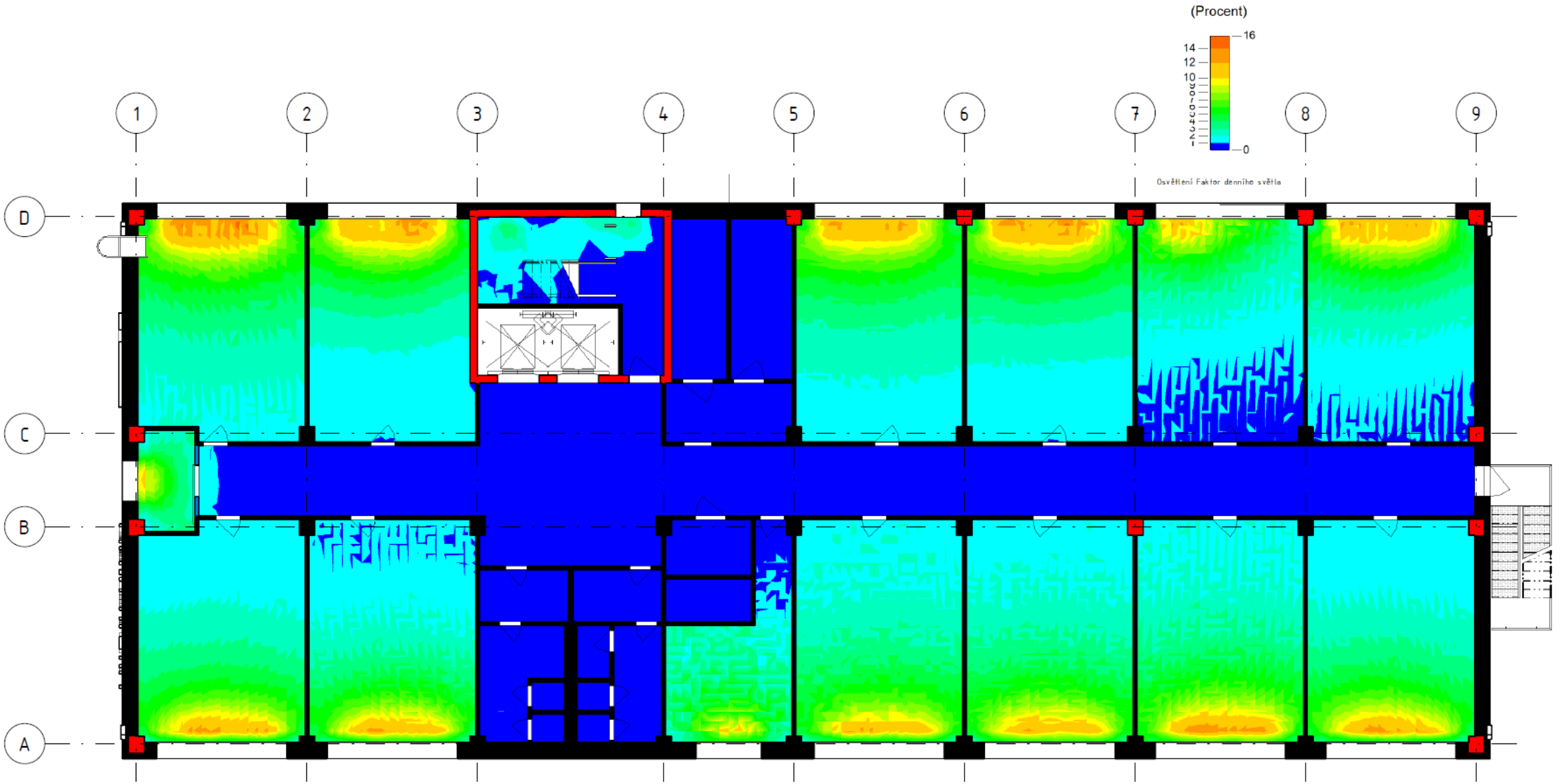
(Procent)
16
14
12
10
0
Osvětlení Faktor denního světla
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B
A

thank you for your attention