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UCEEB
UNIVERZITNÍ CENTRUM ENERGETICKY EFEKTIVNÍCH BUDOV

CONNECTING BIM AND LCA: THE CASE STUDY OF AN EXPERIMENTAL RESIDENTIAL BUILDING

Veselka, Jakub; Růžička, Jan; Lupíšek, Antonín; Hájek, Petr; Mančík, Štěpán; Žďára, Vladimír; Široký, Martin

SBE19 Graz

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CTU IN PRAGUE
FACULTY OF CIVIL ENGINEERING
UNIVERSITY CENTRE FOR ENERGY EFFICIENT BUILDINGS

CURRENT MARKET SITUATION

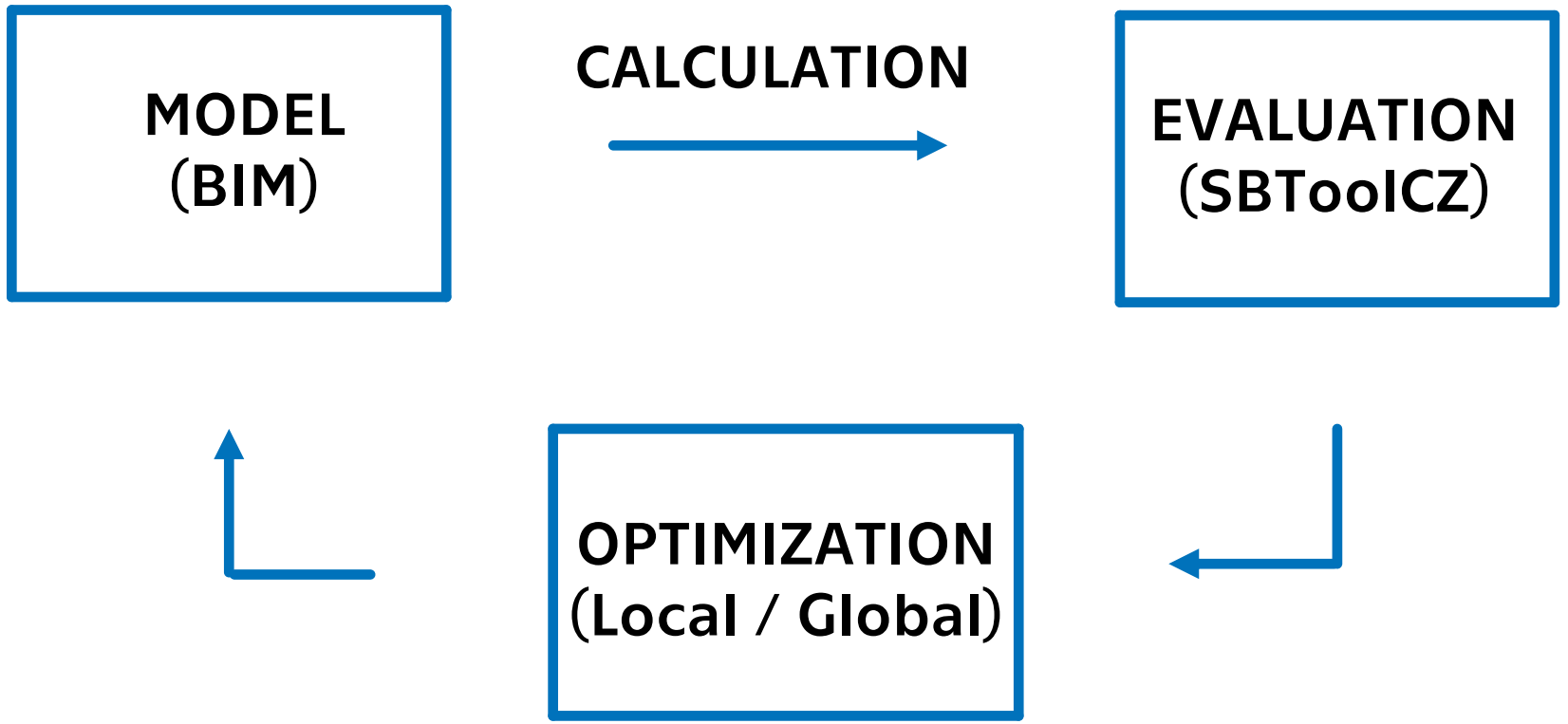
„BIM is widely adopted across EU countries.“

Architects / Engineers (Project Phase)

Contractors (Construction Phase)

Landlords, Users (Operational Phase)

THEORETICAL PART



THEORETICAL PART

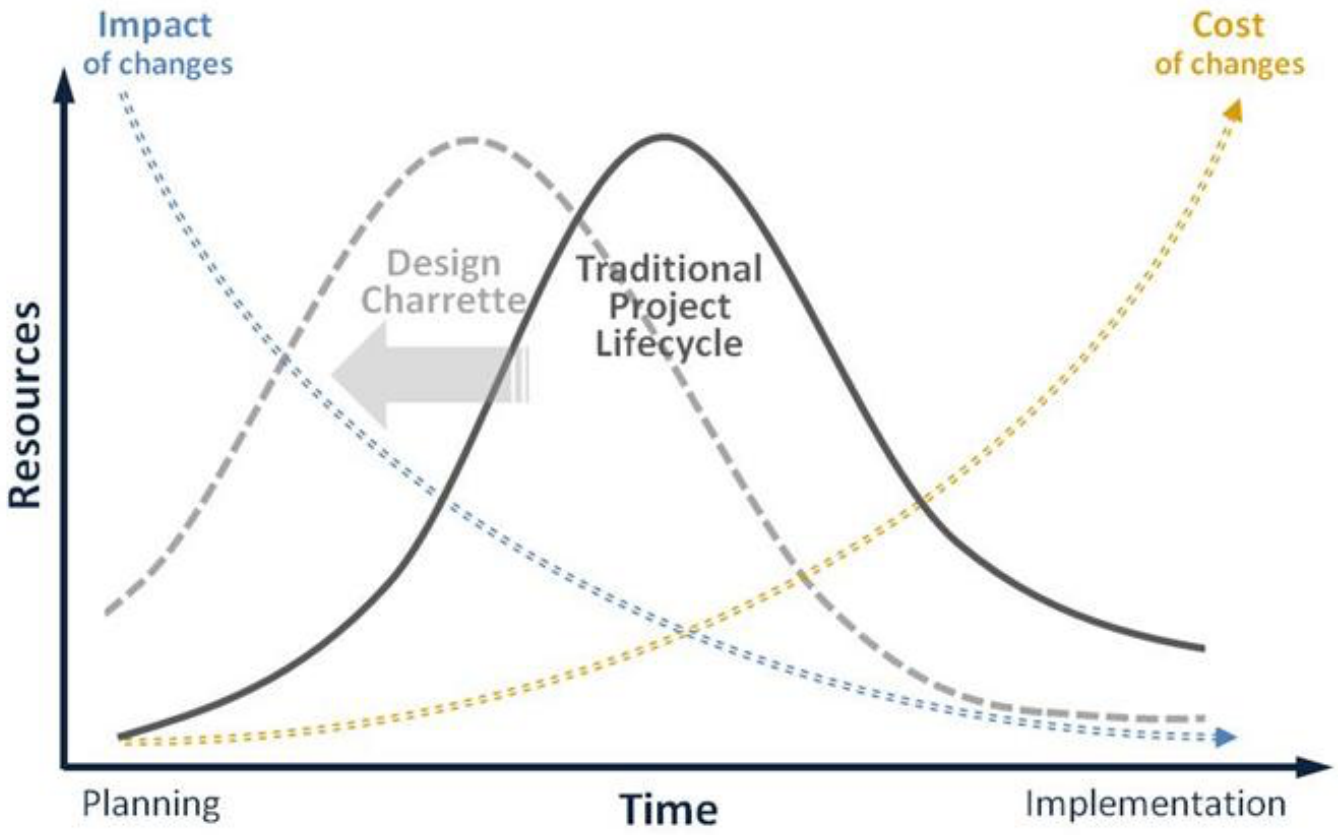
First key queston: when?

Aggegated Data Method

Early Phase (Parametric Design)

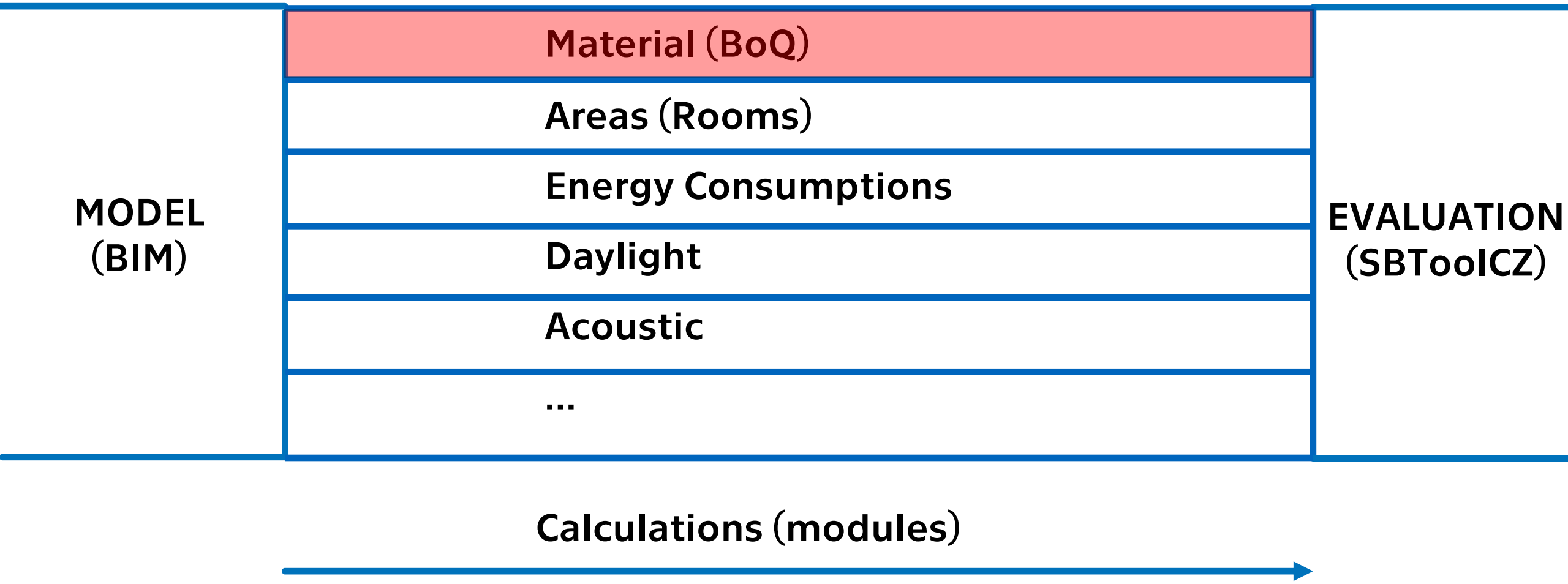
Element Data Method

Detail Phase



http://www.wikinomics.com/blog/index.php/2010/06/29/design-charrettes-for-platform-projects/

THEORETICAL PART



THEORETICAL PART

MODEL (BIM)

Material (BoQ)

+ Environmental Data

Envimat.cz, EcoInvent ...

Primary Energy [MJ/m^3]

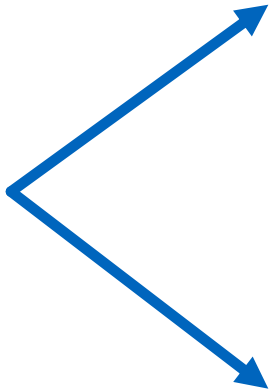
Global Warming Potencial [kg CO2ekv/m^3]

EVALUATION (SBToolCZ)

Calculations (modules)

THEORETICAL PART

Second key queston: where?



Calculations inside the Model

(Revit / Archicad ...)

Calculations outside the Model + data exchange

(external database)

PRACTICAL PART: PROJECT TI-CO

Business Partners

Timber Structure: RD Rýmařov

Reinforced Concrete Structure: ŽPSV

Building Technologies: Siemens

PRACTICAL PART – CASE STUDY

BIM Model, LOD350

PRACTICAL PART – DECISIONS

Key queston: when?

Aggregated Data Model

Element Data Model

Key queston: where?

Calculations IN the Model

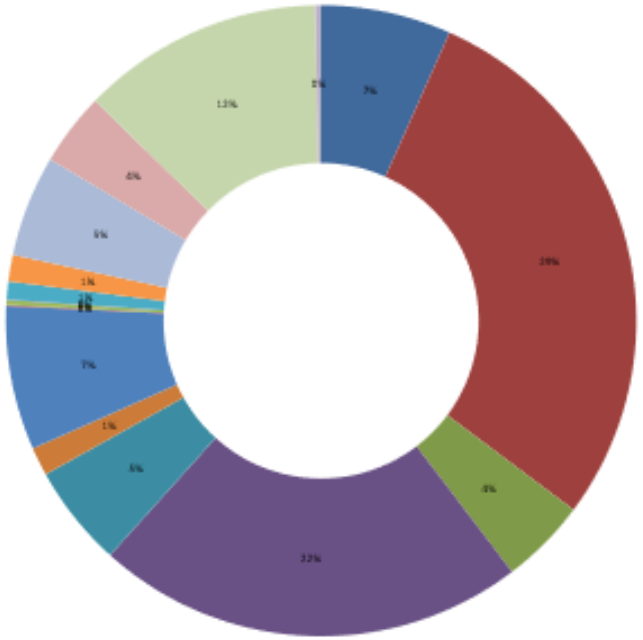
Calculations OUT the Model

BOQ WITH ALL RELATED PARAMETERS

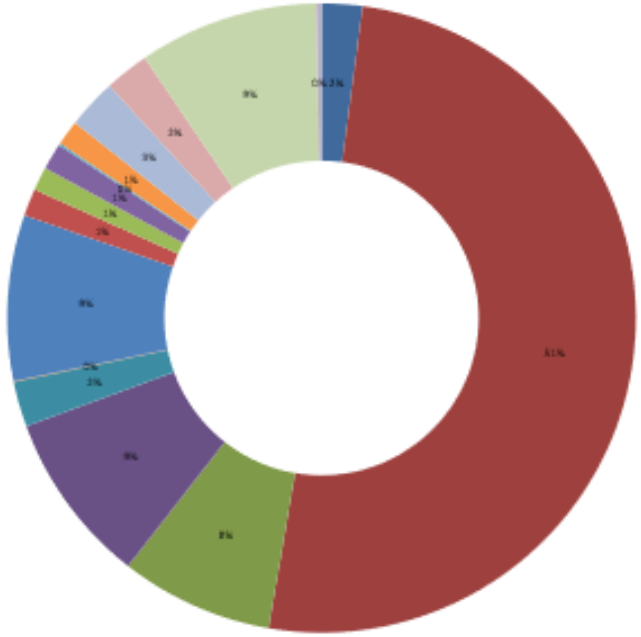
Material: Comments	Material: Volume [m_3]	Material: Area [m_2]	Material: PRIMARY ENERGY INPUT - [MJ/m_3]	PEI Total [MJ]	Material: GLOBAL WARMING POTENTIAL - GWP [PEI CO_2 ekv,/m_3]	GWP Total [kg CO_2,ekv]
CONCRETE	20.01	53	1211	24227	203.0	4061
CONCRETE - REINFORCED	85.48	468	6866	586933	712.0	60865
HIGH PERFORMANCE CONCRETE	13.26	101	6866	91036	712.0	9440
TIMBER STRUCTURE + MINERAL WOOL	65.98	611	1559	102866	119.0	7852
TIMBER STRUCTURE + GLASS WOOL	15.68	199	1718	26931	110.0	1724
TIMBER STRUCTURE 60/40; 420mm + AIR GAP	4.36	109	116	506	8.0	35
GYPSUM FIBREBOARD	22.12	1265	4465	98758	392.0	8670
HYDROIZOLATION	0.17	116	92964	16184	3377.0	588
BRICK VENEER	0.71	101	19861	14092	1480.0	1050
STEEL	0.08	24	189700	15746	17146.8	1423
GLASS	2.76	100	442	1218	36.0	99
THERMAL INSULATION - WOODENFIBRE	4.06	90	3682	14948	149.0	605
THERMAL INSULATION - EPS - FAÇADE	15.56	104	1903	29605	83.0	1291
THERMAL INSULATION - EPS - FLOOR	11.17	111	2365	26426	104.0	1162
THERMAL INSULATION - EPS - ROOF	37.25	116	2880	107279	126.0	4693
THERMAL INSULATION - XPS	0.86	17	3463	2989	138.0	119
SUM	**299.51**			**1159744**		**103679**

ENVIRONMENTAL ANALYSIS

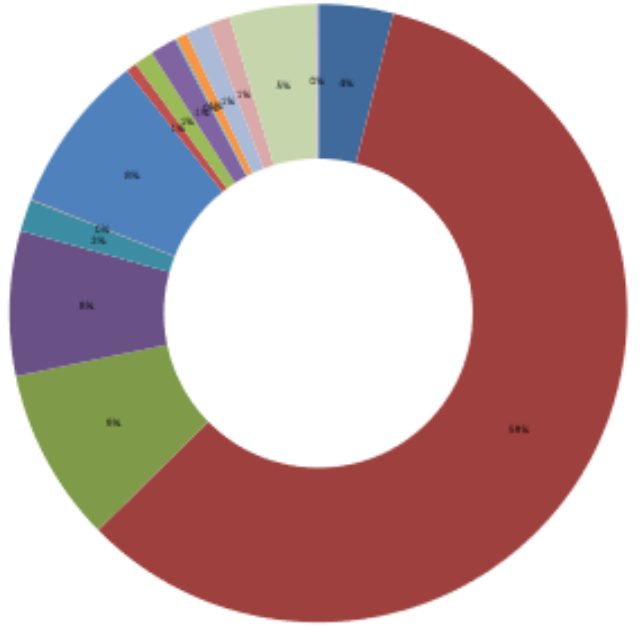
Volume [%]



Primary energy input [%]



Global warming potential [%]



- CONCRETE
- CONCRETE - REINFORCED
- HIGH PERFORMANCE CONCRETE
- TIMBER STRUCTURE + MINERAL WOOL
- TIMBER STRUCTURE + GLASS WOOL
- TIMBER STRUCTURE 60/40; 420mm + AIR GAP
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- STEEL
- GLASS
- THERMAL INSULATION - WOODENFIBRE
- THERMAL INSULATION - EPS - FAÇADE
- THERMAL INSULATION - EPS - FLOOR
- THERMAL INSULATION - EPS - ROOF
- THERMAL INSULATION - XPS

CONCLUSION AND FUTURE FOCUS

Environmental calculations inside BIM model have many obstacles

High demands on architect in terms of:

- Building Assesment skills

- BIM skills

FUTURE FOCUS

We started to create a **bridge between BIM model and external environmental database** which will allow easy building assesment with using BIM model

GENERAL CHALLENGES

- Missing guidlines / legislation on a national level
- Lack of EIRs/BEPs on the market
- Model Quality from another project Stakeholders

ANY QUESTIONS?

Thank you for your attention!

jakub.veselka@fsv.cvut.cz

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