

Ing. David Seidl, Ph.D. — Ing. Lukáš Klein — doc. Ing. Lukáš Prokop, Ph.D.

# UMĚLÁ INTELIGENCE VE SLUŽBÁCH FOTOVOLTAIKY

VŠB TECHNICKÁ  
UNIVERZITA  
OSTRAVA

CENTRUM ENERGETICKÝCH  
A ENVIRONMENTÁLNÍCH  
TECHNOLOGIÍ

CENTRUM  
ENET



Aplikace umělé inteligence  
a kvantového počítání v energetice

12. listopadu 2025  
IT4Innovations



**Zvýšení odolnosti energetických sítí v kontextu dekarbonizace,  
decentralizace a udržitelného socioekonomického rozvoje**

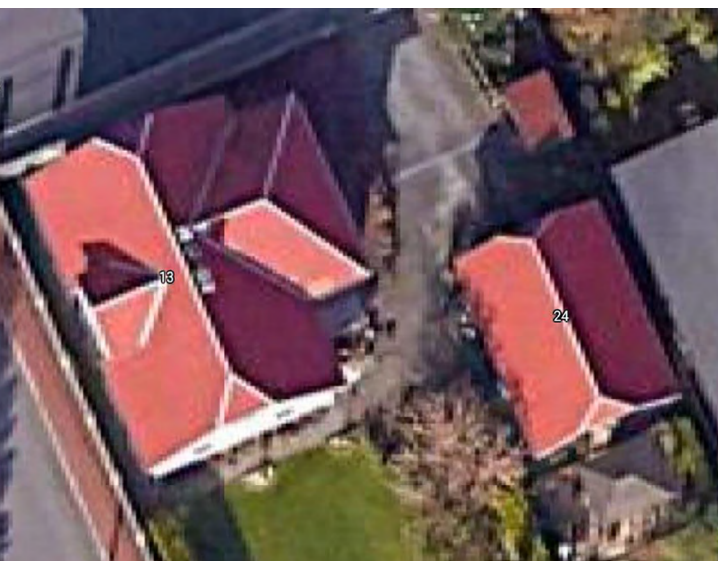
CZ.02.01.01/00/23\_021/0008759

Operační program Jan Amos Komenský

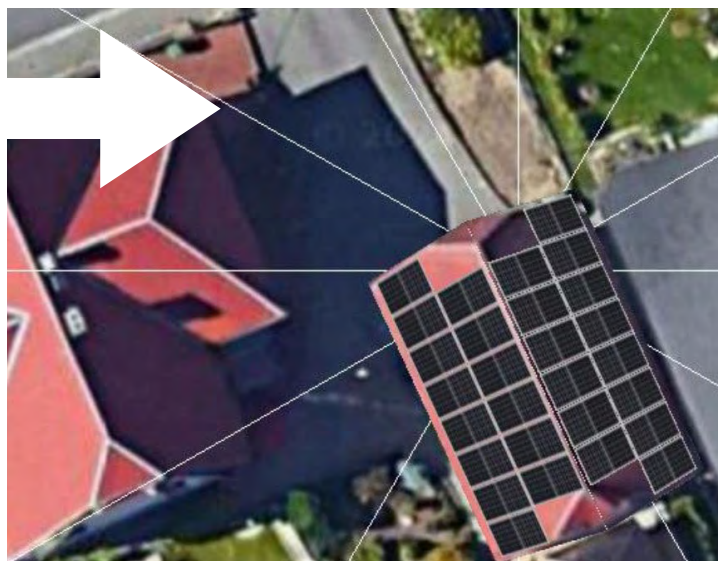


**Spolufinancováno  
Evropskou unií**

# Klasický postup při návrhu FVE



Ortofoto  
mapy



Návrh FVE

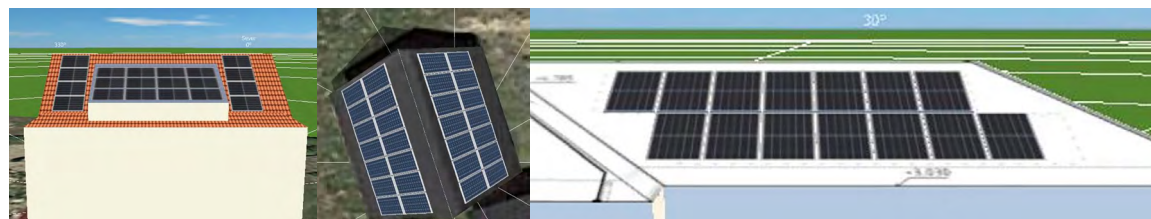


Realita

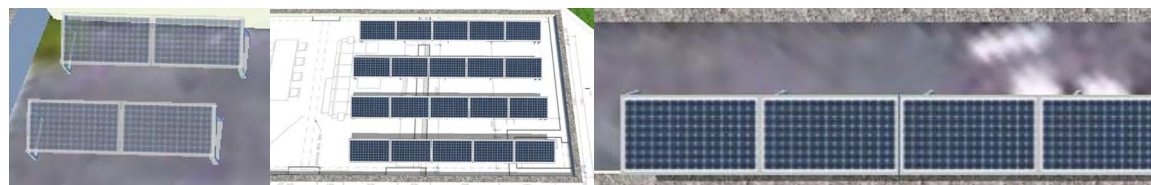
# Studie pro MSK

Studie simulace bilancí energie  
vyrobené z fotovoltaických systémů  
a větrných elektráren v MSK

Šikmá (72%) 0,12 kWp/m<sup>2</sup>



Rovná (25%) 0,1 kWp/m<sup>2</sup>

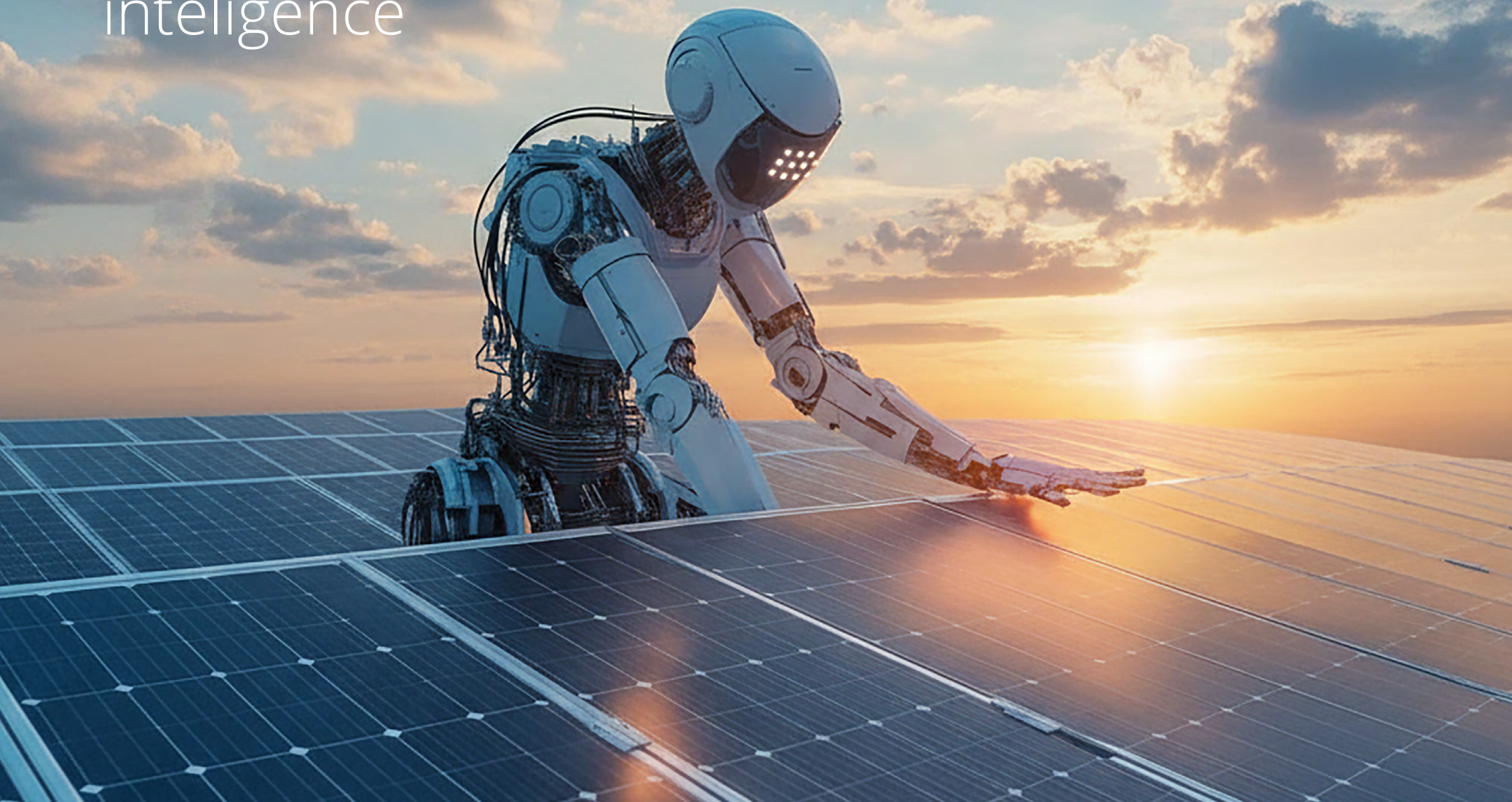


| Typ budovy | Plocha (m <sup>2</sup> ) | Potenciální<br>instalovaný<br>výkon (kWp) | Potenciální<br>roční produkce<br>(GWh) |
|------------|--------------------------|-------------------------------------------|----------------------------------------|
| Plochá     | 1 455 0974               | 1 592 198                                 | 1484                                   |
| Šikmá      | 4 223 9103               | 5078410                                   | 4792                                   |
| Celkem     | 5679 0077                | 6670608                                   | 6277                                   |

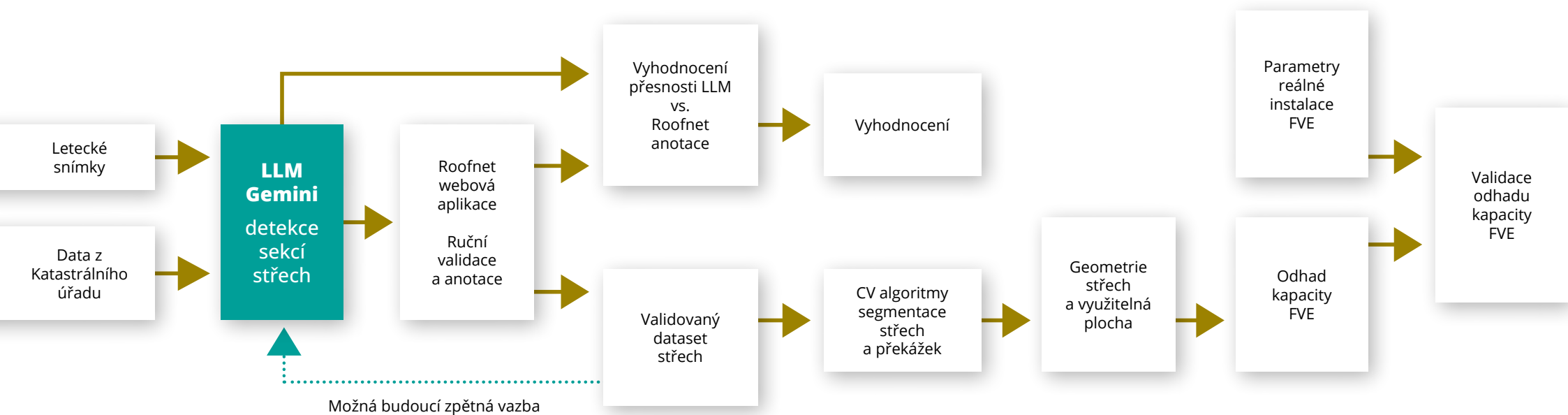
Umělá inteligence ve službách fotovoltaiky

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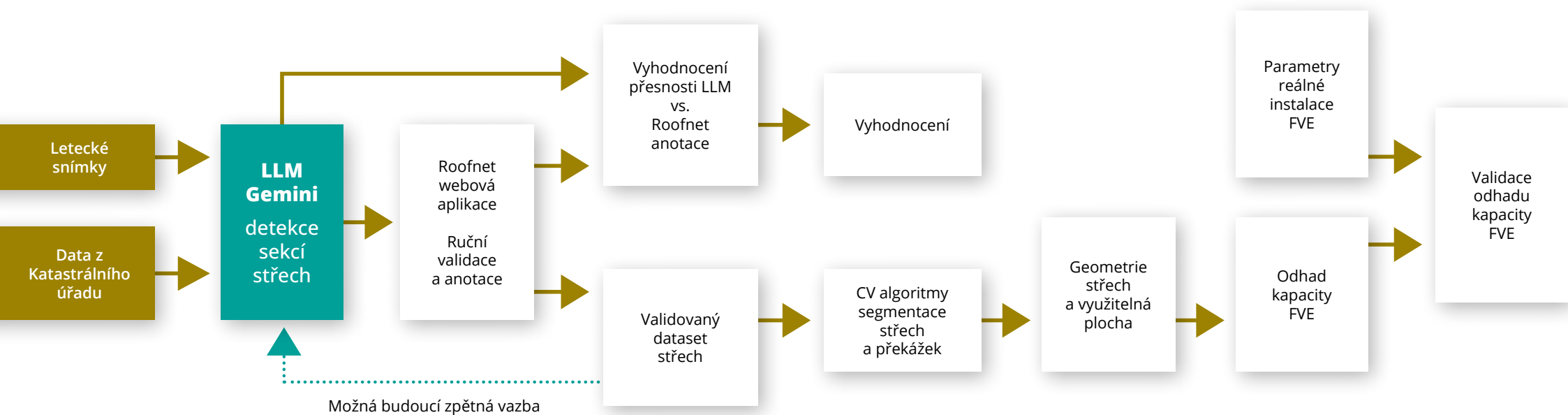
# Příchod umělé inteligence



# Diagram detekce



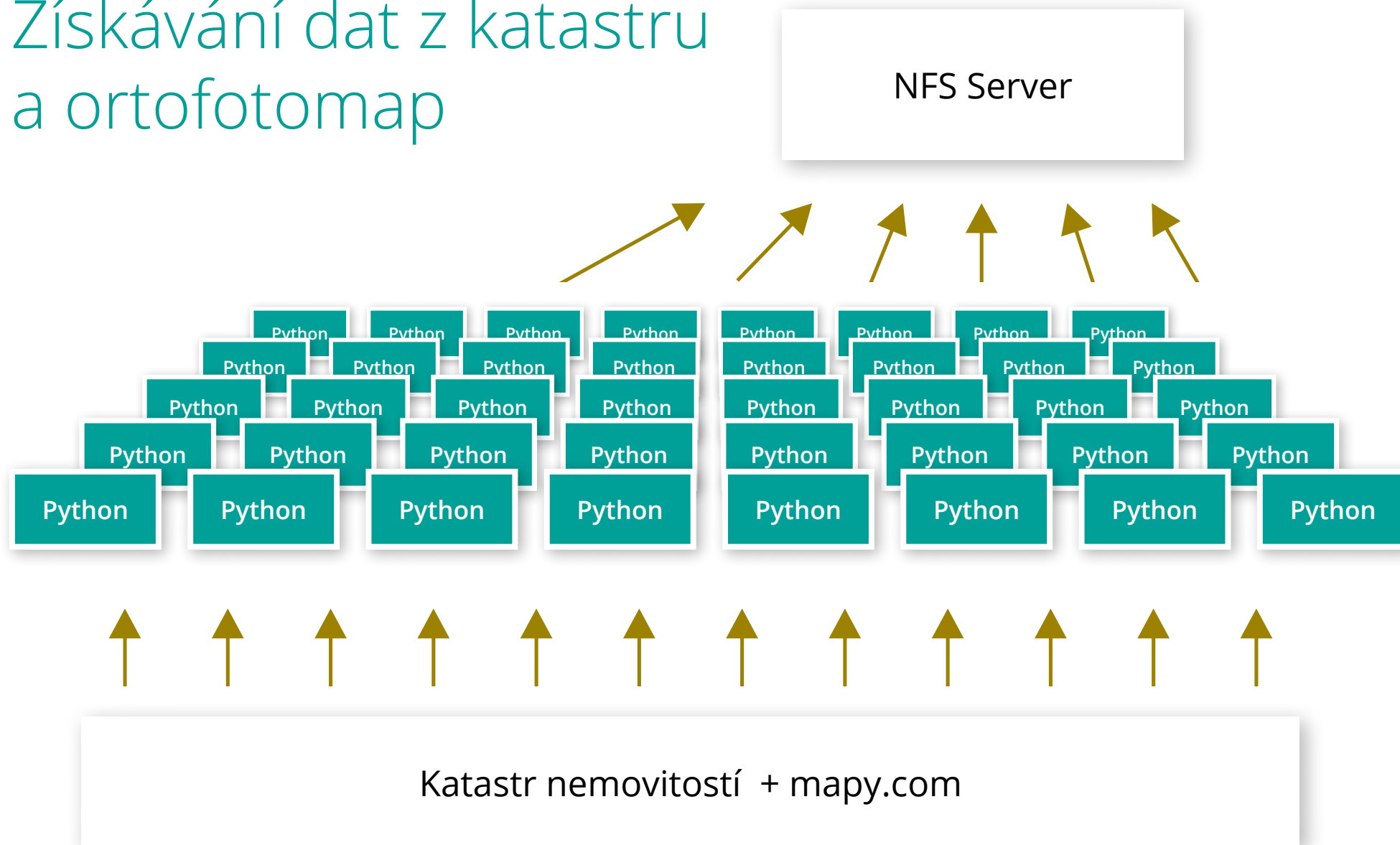
# Diagram detekce



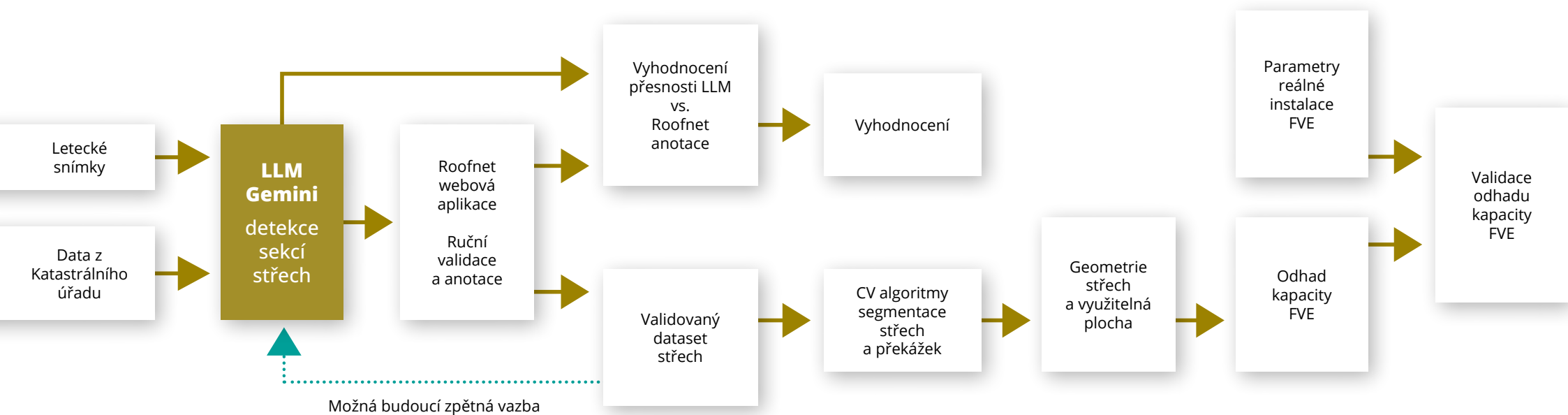
## Potřebná data



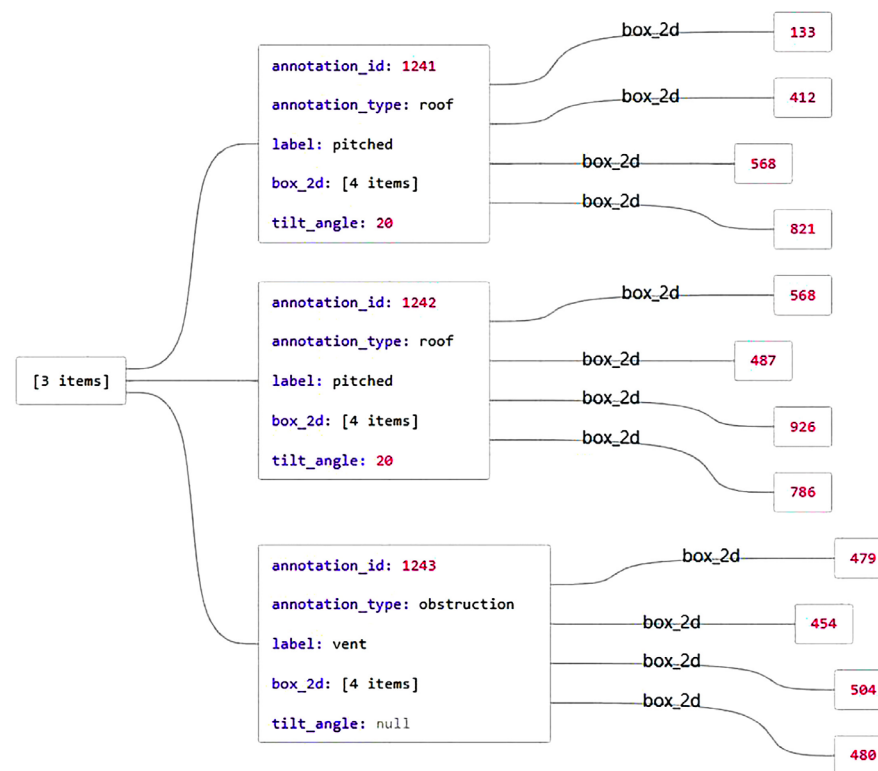
# Získávání dat z katastru a ortofotomap



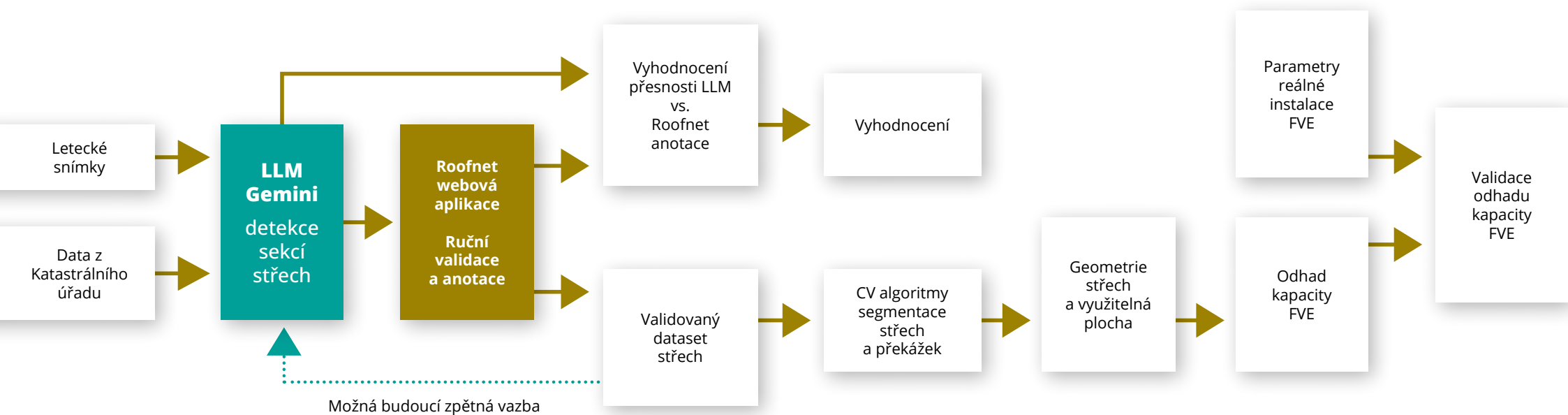
# Diagram detekce



# Výsledek = obrázek + data (JSON)



# Diagram detekce



# Roofnet webová aplikace

## Image Annotation

Annotating: pcfeib208-22-92\_BU.10557107.png (Using Original Set ID: 9063)



ADD ROOF FIELD

ADD OBSTRUCTION

SAVE & NEXT IMAGE

SKIP IMAGE

### Edit Roof Field

ID: 52203

Predefined Label

pitched

Custom Label

pitched

Tilt Angle (degrees)

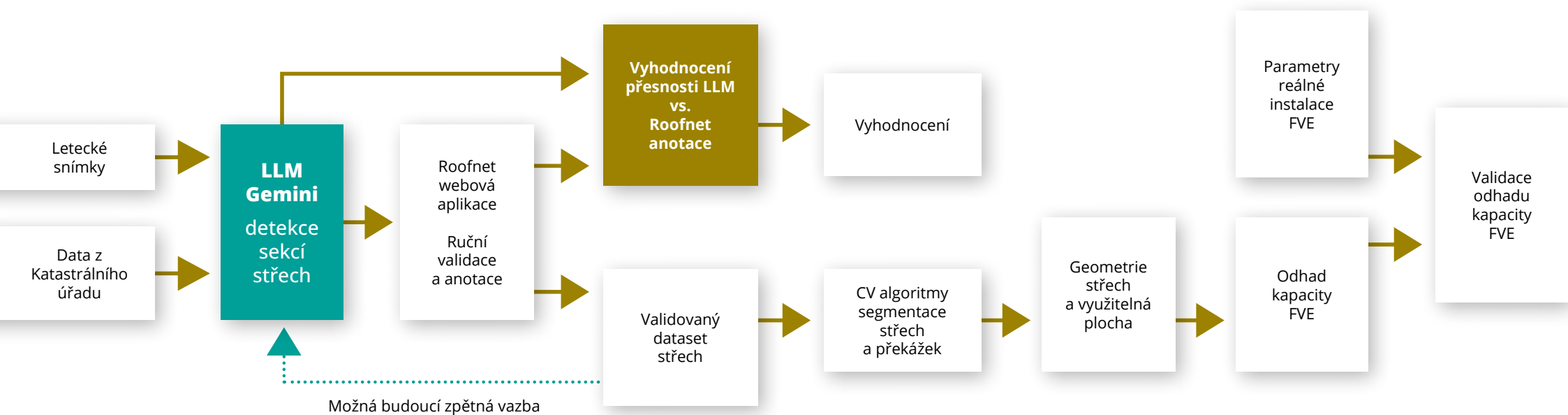
30

Enter the tilt angle in degrees. Leave empty for no tilt.

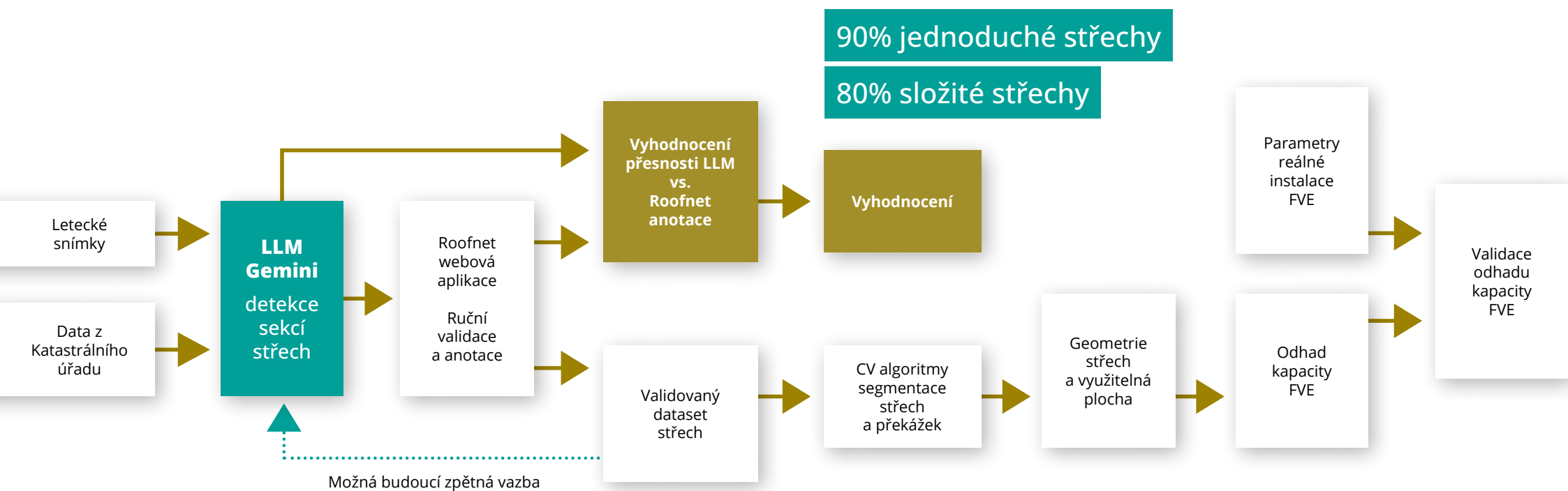
DELETE THIS BOX

SHOW TILT ANGLES

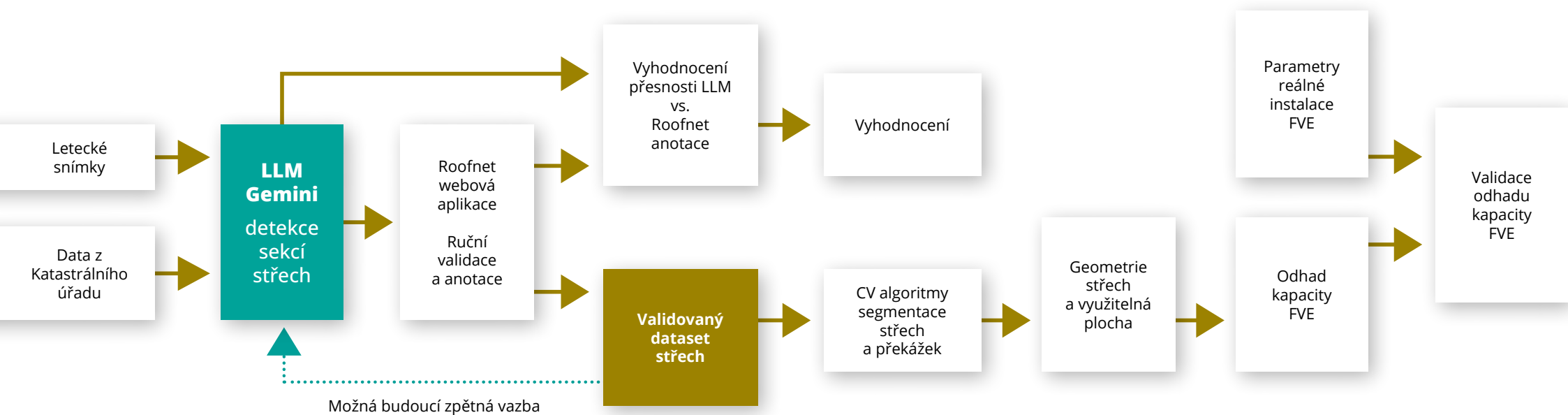
# Diagram detekce



# Diagram detekce



# Diagram detekce



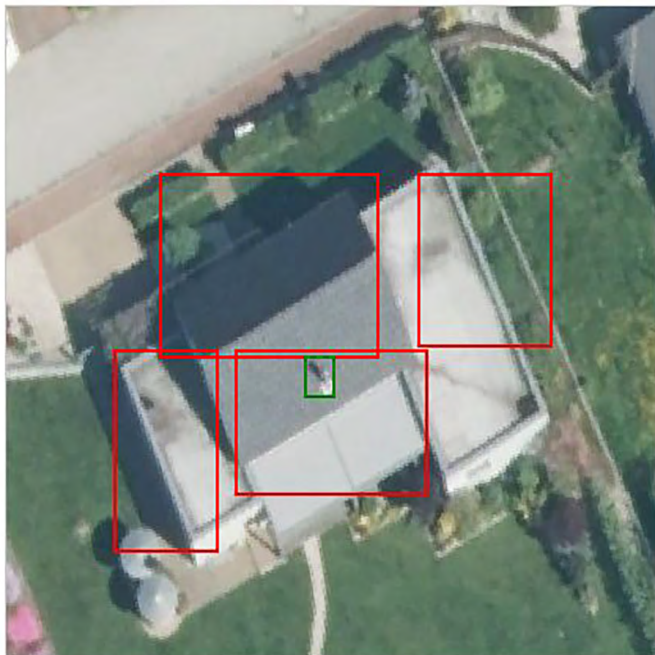
# Roofnet validace

## Annotation Validation

Select Image to Validate

building\_13.png

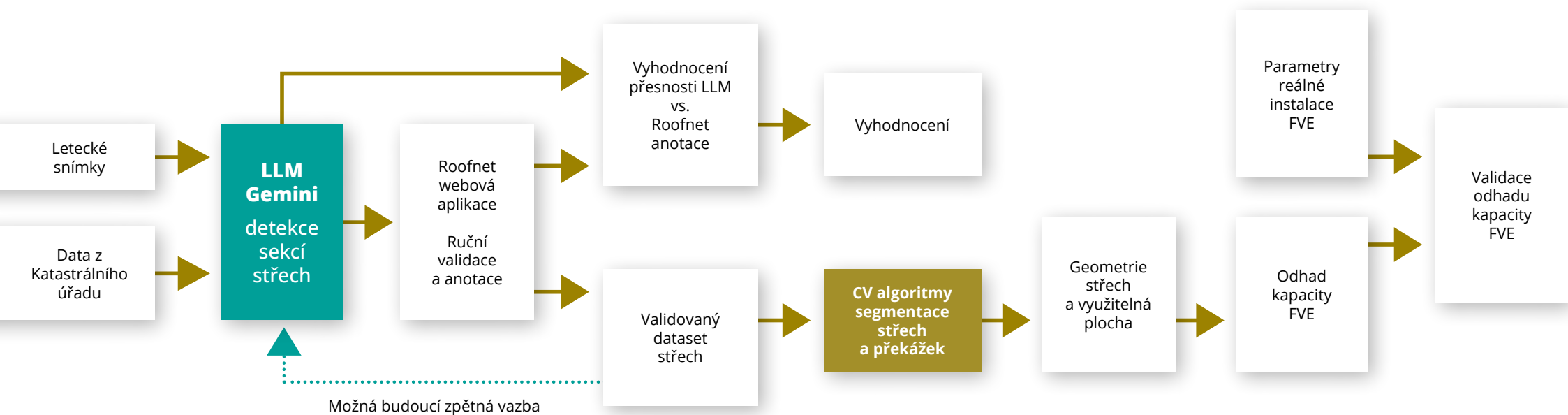
Image: building\_13.png (Viewing Set ID: 19 - Original)



### Annotation Sets

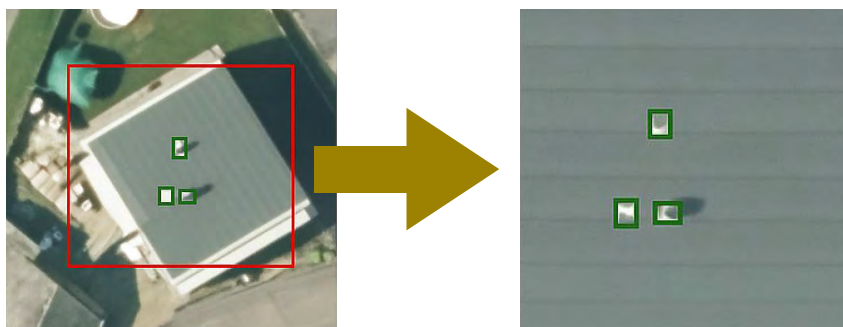
- ☐ Original Set  
ID: 19 | Submitted: 2. 4. 2025 14:47:17  
- ☐ User: TEJ0017  
ID: 118 | Submitted: 2. 4. 2025 15:44:45  
- ☐ User: com0005  
ID: 11802 | Submitted: 28. 4. 2025 21:07:38  

# Diagram detekce

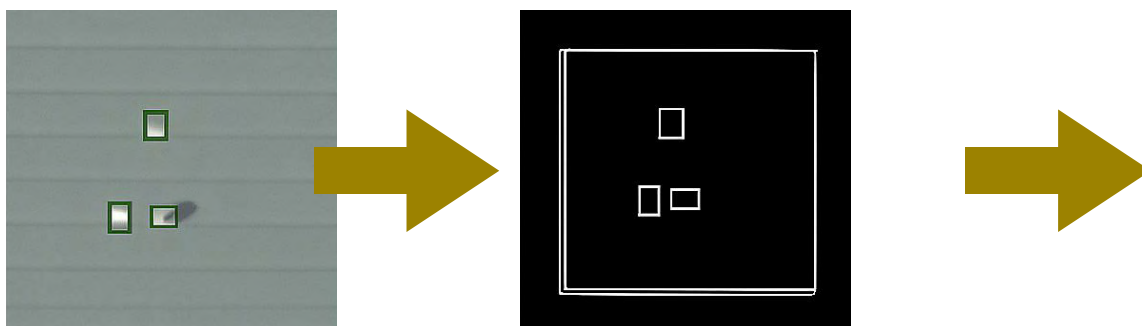


# CV algoritmy    computer vision

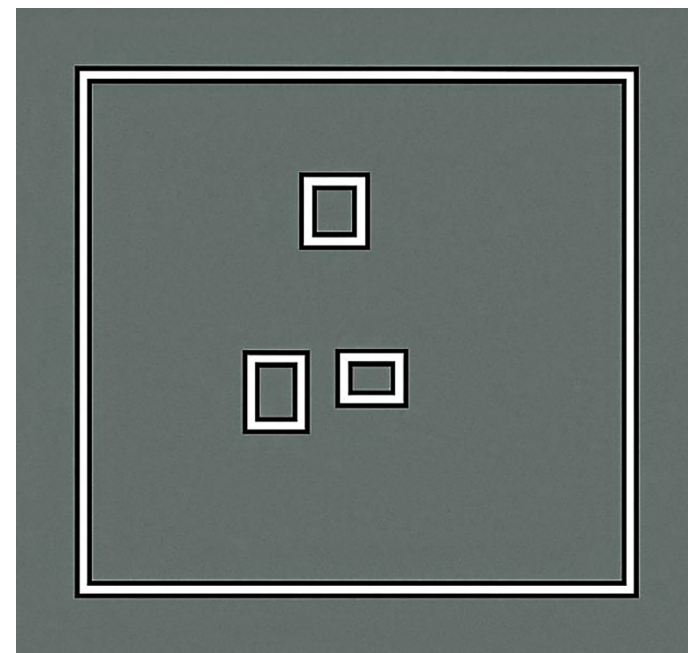
Oříznutí a normalizace



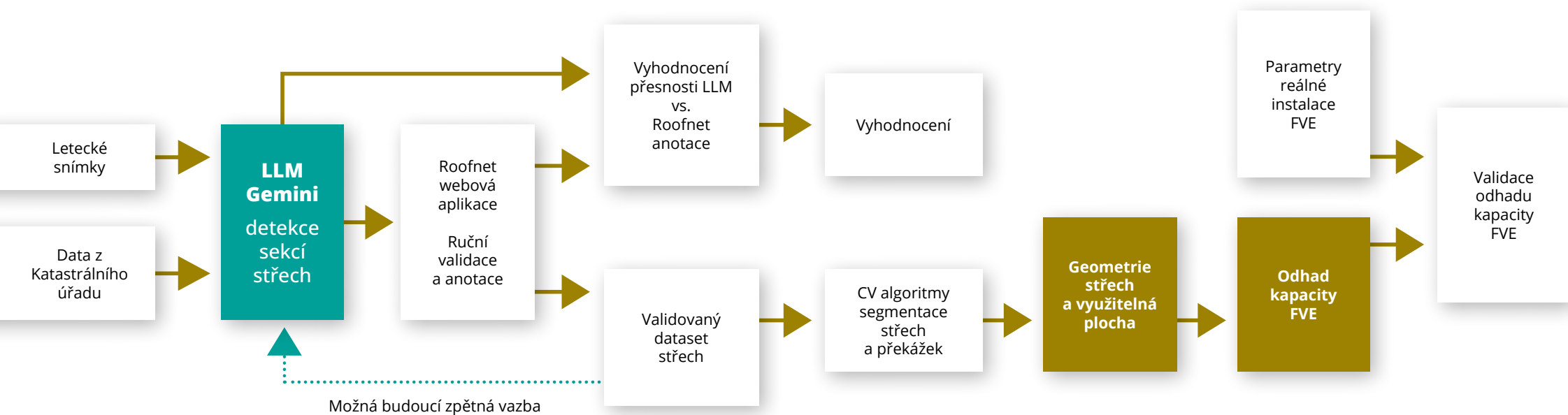
Detekce hran a maska



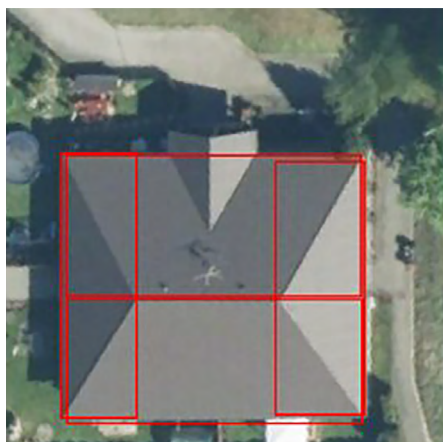
Začištění masky  
a polygonizace



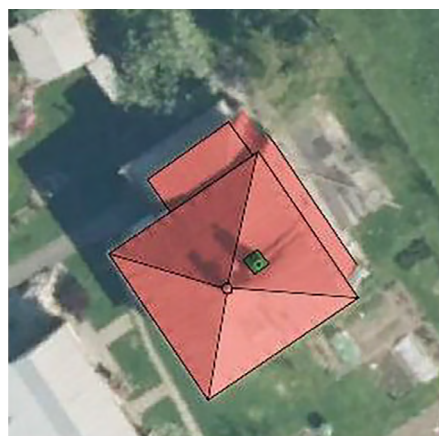
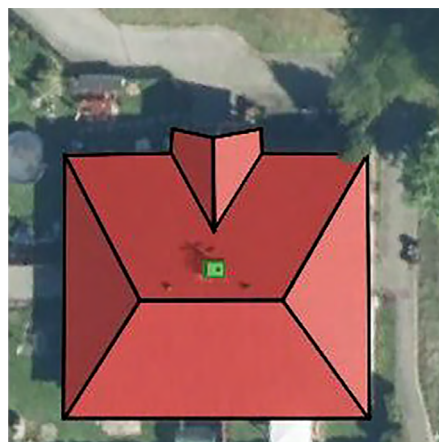
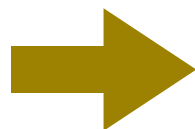
# Diagram detekce



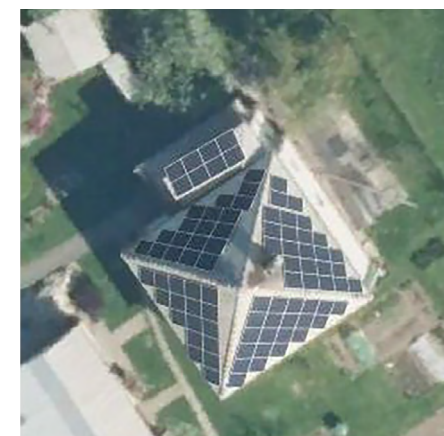
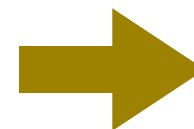
# Geometrie střech a využitelná plocha



LLM Bounding boxes

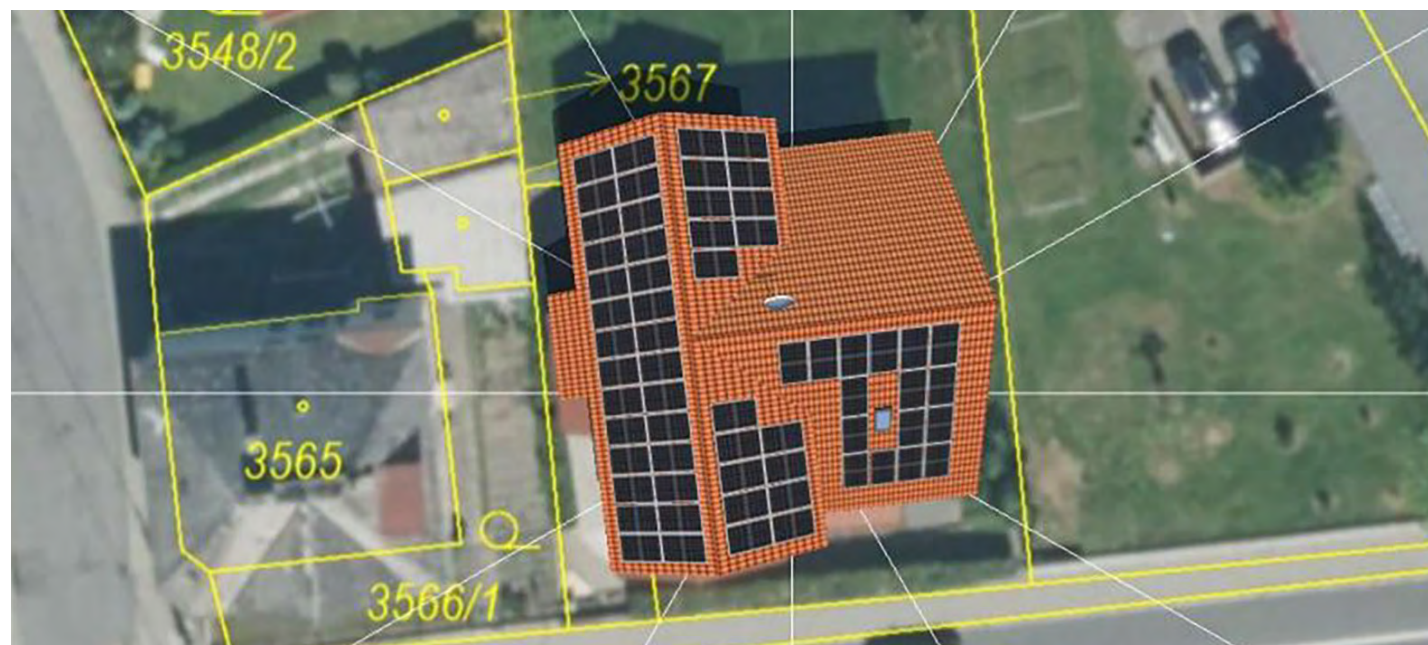


CV Segmentizace



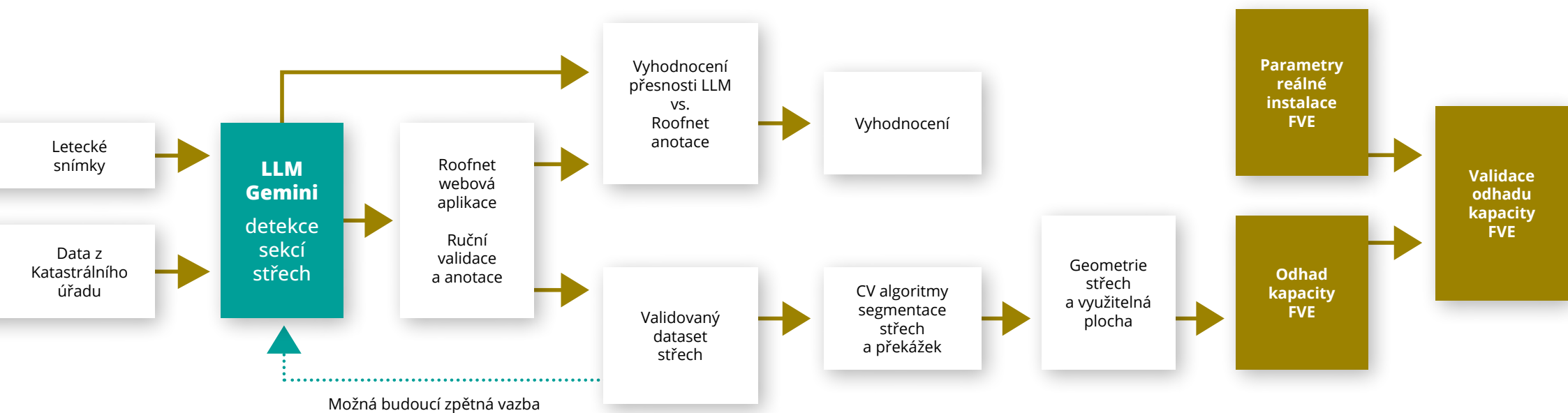
Výpočet kapacity FVE  
obrázky jsou idealizované

# Výsledky



| obrázek střechy | využitelná plocha<br>[m <sup>2</sup> ] | odhadovaný výkon<br>[kWp] | reálný výkon<br>[kWp] | rozdíl<br>[kWp] | odchylka<br>[ - ] |
|-----------------|----------------------------------------|---------------------------|-----------------------|-----------------|-------------------|
| building 013    | 42,5                                   | 7,6                       | 7,5                   | +0,1            | 1,01              |
| building 047    | 55,2                                   | 9,3                       | 8,0                   | +1,3            | 1,16              |
| building 102    | 33,0                                   | 5,9                       | 5,0                   | +0,9            | 1,18              |
| building 119    | 18,7                                   | 3,0                       | 4,2                   | -1,2            | 0,71              |
| building 201    | 27,4                                   | 4,8                       | 4,5                   | +0,3            | 1,07              |

# Diagram detekce



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**Děkuji Vám  
za pozornost**

**Ing. David Seidl, Ph.D.**

david.seidl@vsb.cz

