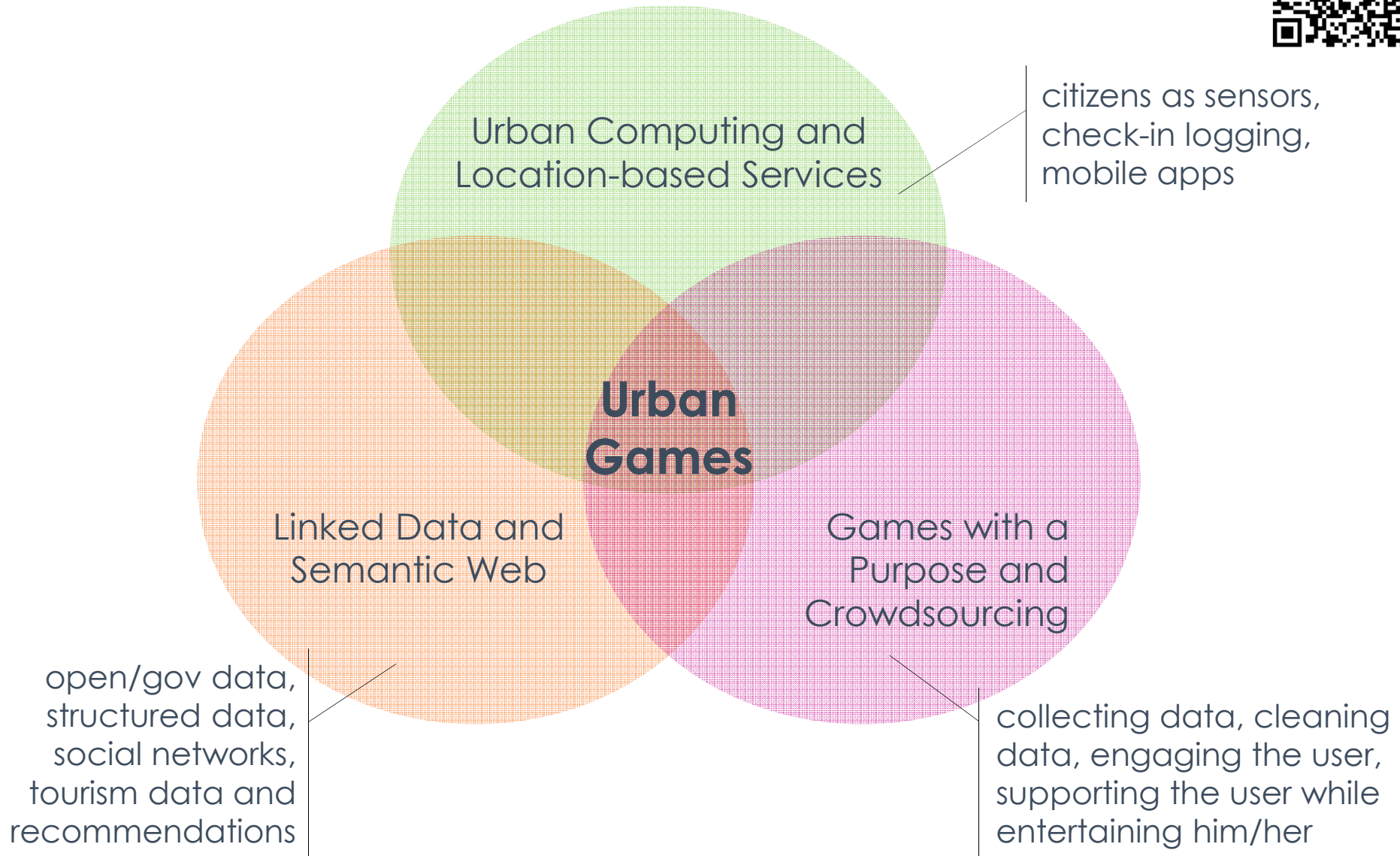# UrbanMatch – linking and improving Smart Cities Data

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Three converging trends

Urban Computing and Location-based Services

citizens as sensors, check-in logging, mobile apps

Urban Games

Linked Data and Semantic Web

Games with a Purpose and Crowdsourcing

open/gov data, structured data, social networks, tourism data and recommendations

collecting data, cleaning data, engaging the user, supporting the user while entertaining him/her

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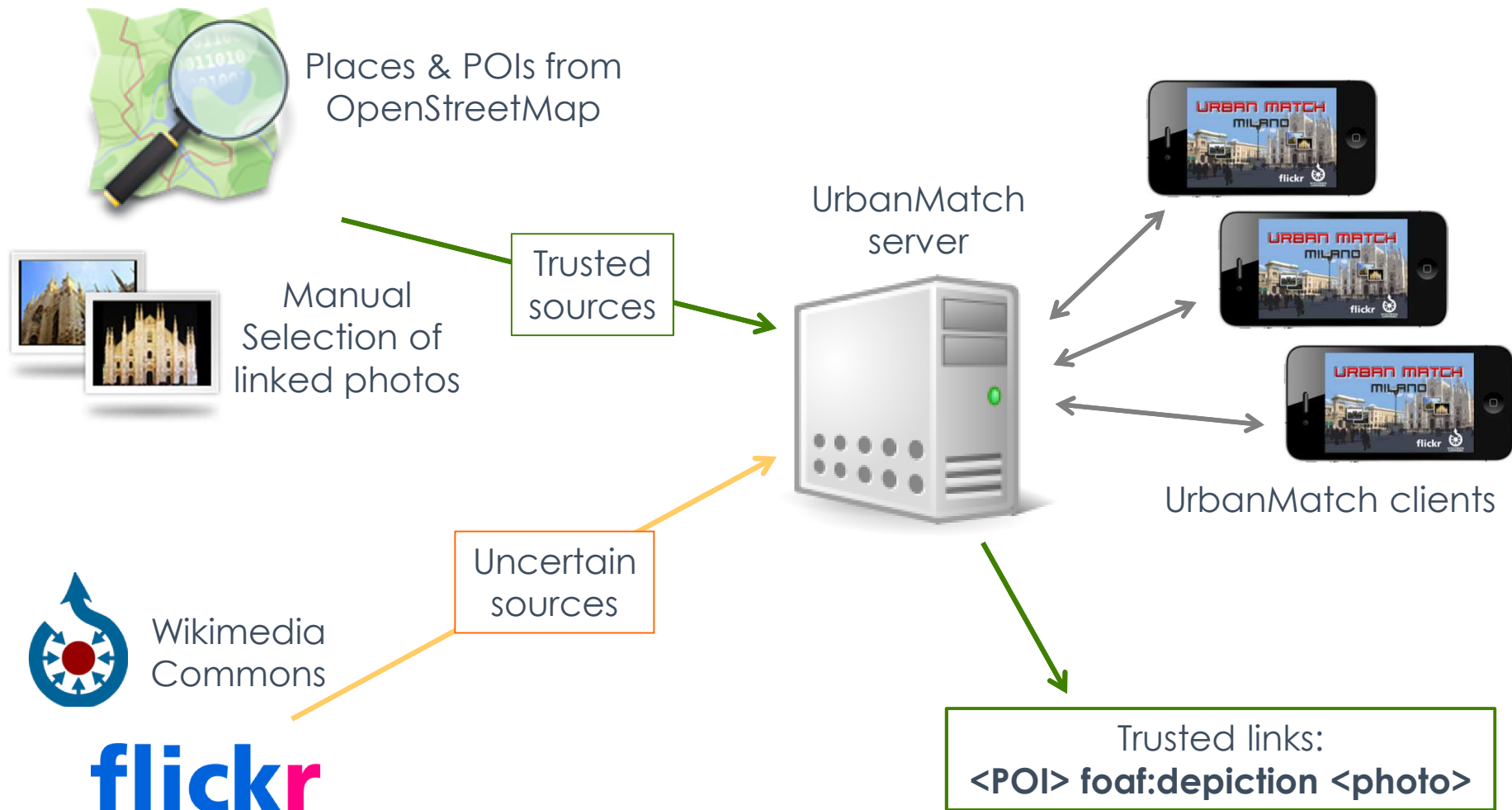
Research hypothesis

- Urban Games:
    - to **consume**, **create** and **assess the quality** of Smart Cities-related **Linked Data**
    - via a **Human Computation** approach
    - for users in **mobility** with **smart phone** devices

- Traditional Human Computation approaches are based on users' *domain knowledge…*

    …while Urban Games are based on and aim at exploiting "on site" users' **experience knowledge**

- **UrbanMatch** is our first prototype of Urban Games: a GWAP for iPhone aimed to create links between urban POIs and their most representative photos

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UrbanMatch: input and output data

Places & POIs from OpenStreetMap

Manual Selection of linked photos

Trusted sources

UrbanMatch server

UrbanMatch clients

Wikimedia Commons

Uncertain sources

flickr

Trusted links:
<POI> foaf:depiction <photo>

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UrbanMatch: gameplay

Video at: http://youtu.be/FYBXxwAL0NY

UrbanMatch: achieving the purpose

Trusted links are constituted by *correct* POI-photo couples (i.e. the correlation between the photo and the depicted POI was verified)

When a POI-photo link is assessed to be correct, it becomes trusted

Trusted link

POI

Candidate links

POI

Post-Processing

UrbanMatch players

New trusted link

POI

Incorrect link discarded

POI
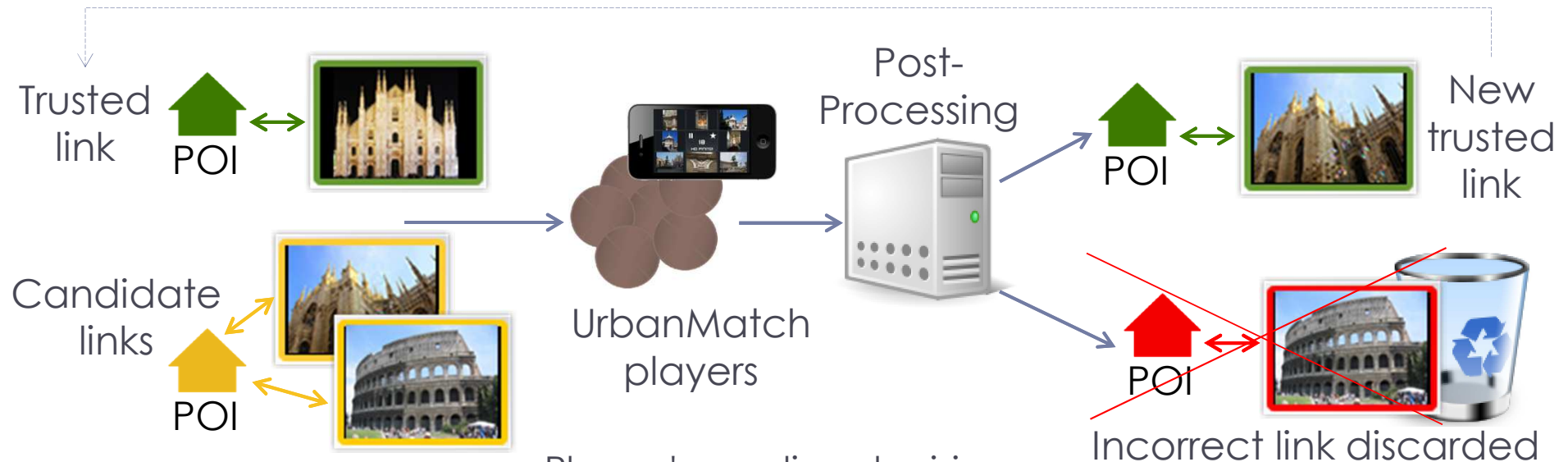
Candidate links are those returned by the uncertain sources (e.g. Duomo-photoXYZ with photoXYZ retrieved via a Flickr API geo-search for Duomo)

Players' coupling decisions are collected and then post-processed

When a POI-photo link is assessed to be incorrect, it is discarded and never again proposed to players

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UrbanMatch: links and confidence value

Trusted sources

manually selected photos

Trusted links

POI ↔ [image]

~ 200

Uncertain sources

Wikimedia Commons

flickr

Candidate links

POI ↔ [image]

~ 37,000

POI ↔ [image]

Confidence value

initial value	value changes on players' choices	
60%	[graph]	**trustable** when > upper threshold
40%	[graph]	**incorrect** when < lower threshold
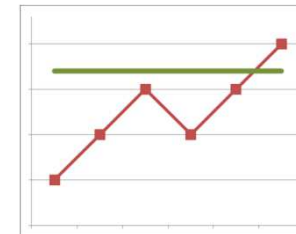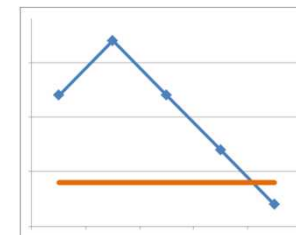
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UrbanMatch evaluation (1/2)

Data Quality Metrics

- Evaluation data
  - 54 unique players, 290 games (781 game levels)
  - 2006 input links, 1284 assessed (trustable/incorrect)
  - upper threshold 70%, lower threshold 20%

- **Completeness**
  - def: assessed links (trusted+incorrect) / all input links
  - intuitively: *game ability to assess input links*
  - globally from 1.54% (only manually-checked links) to **4.98%**
  - trusted links have tripled (incremented by **322%**)

- **Accuracy**
  - def: correctly assessed links (w/ FP+FN) / all assessed links
  - intuitively: *game ability to correctly assess input links*
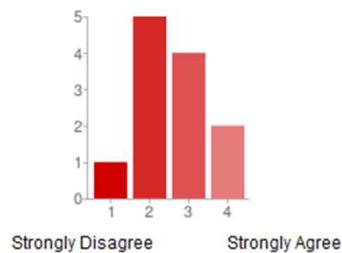 - **99.4%** (only 4 False Positive and 8 False Negative links)
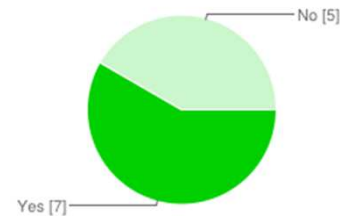
UrbanMatch evaluation (2/2)

User-based evaluation: actual "engagement"

- Based on game evaluation literature and integrated with our research-specific questions
- Questionnaire at http://bit.ly/um-survey
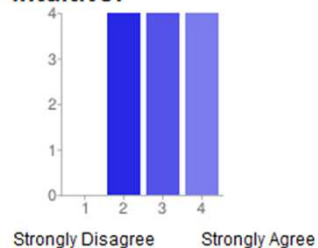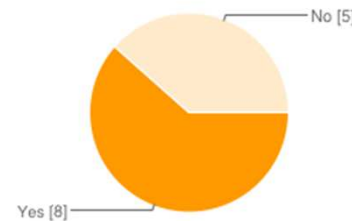- Findings:

Are the game rules simple, clear and intuitive?

Is it useful playing in the urban space?
No [5]
Yes [7]

Was the game interface clear and intuitive?

Did you suggest your friends to play?
No [5]
Yes [8]

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Conclusions and next steps

- Evaluation results seem to prove our research hypothesis
    - **Purpose "hiding"** is key to GWAP success
    - Publication of generated links as **Linked Open Data**
    - Further evaluation on **GWAP-specific metrics**

- UrbanMatch Milano soon to be followed by its "brother" app **UrbanMatch Munich** ☺
    - **Comparative evaluation** of UrbanMatch vs. manual assessment via domain experts

- A more complex Urban Game under development to prove our research hypothesis on different kinds of Smart Cities-related Linked Data
    - **Urbanopoly** game coming soon from PlanetData project...

Thanks for your attention!
Any question?

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