

## Towards a Living Lab for Information Retrieval Research and Development

A proposal for a living lab for product search tasks

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## Background: The Data Divide

- Academia
  - **Evaluation of IR systems is major challenge**
  - Current solutions tend to be **abstractions** from **reality**
  - Evaluation is often performed **out of context**, i.e., not with real users
- Industry
  - In stark contrast, they evaluate **real applications** with **real users**
  - They have access to data and resources academics can only dream of

## The 2020 Challenges of IR Evaluation

- Finding the relevance in “*academic*” IR evaluations
- Moving research out of the lab and into the real-world
- Showing the social, economic and technical impact research has in practice. Providing evidence!
- **Bridging the data-divide** through collaboration and cooperation
- Building the **next-generation** of **evaluation platforms**
  - **Towards living labs....**

## What is a Living Lab?

- [Kelly et al., 2009] suggest that:
  - “A **living laboratory** on the Web that brings **researchers and searchers** together is needed to facilitate ISSS [Information-Seeking Support System] evaluation. Such a lab might contain **resources and tools** for **evaluation** as well as **infrastructure** for collaborative studies. It might also function as a point of contact with those interested in participating in ISSS studies”
- [Pirolli, 2009] comments that a living lab would be:
  - “a **great attractor** for **scientific minds** in diverse areas ranging from behavioral economics, incentive mechanisms, network theory, cognitive science, and human computer interaction...”
- Lots of discussion, though no concrete definitions or proposals

## A Living Lab

- Provides **infrastructure** to **support** and facilitate **IR experimentation**
- **In situ** and **in context** with **real users** on **real applications**
  - Bringing together Industry/Business, Researchers/Developers, Trusted Third-Party, e.g., an Evaluation Forum and Users
  - to research, develop and evaluation state of the art and cutting edge methods, models, systems and applications.
- **User** and **Researcher Participation** in the **Design** and **Development** of **Online Products** and **Services**.

## Step towards developing a living lab

- Standard Test Collection
  - Extended Test Collections
  - Simulation of Interaction
  - Observational Test Centers
  - Sandboxes
  - Fully Integrated Living Lab
- System focused  
↓  
Application focused

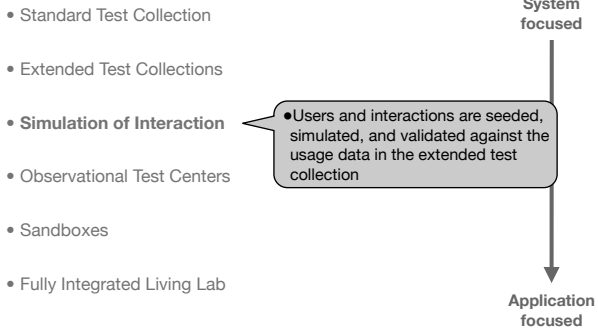
## Step towards developing a living lab

- **Standard Test Collection**
    - Testbed containing documents, topics, and relevance judgments
    - Most TREC/CLEF/INEX collections
  - Extended Test Collections
  - Simulation of Interaction
  - Observational Test Centers
  - Sandboxes
  - Fully Integrated Living Lab
- System focused  
↓  
Application focused

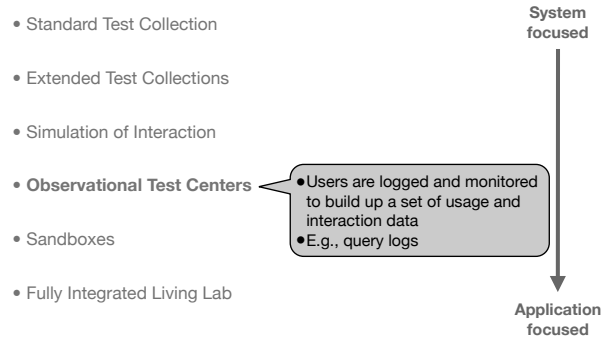
## Step towards developing a living lab

- Standard Test Collection
  - **Extended Test Collections**
    - Test collection augmented with usage and interaction data
    - TREC Interactive and HARD tracks
  - Simulation of Interaction
  - Observational Test Centers
  - Sandboxes
  - Fully Integrated Living Lab
- System focused  
↓  
Application focused

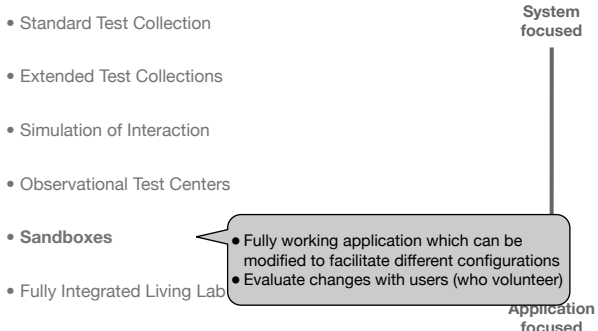
### Step towards developing a living lab



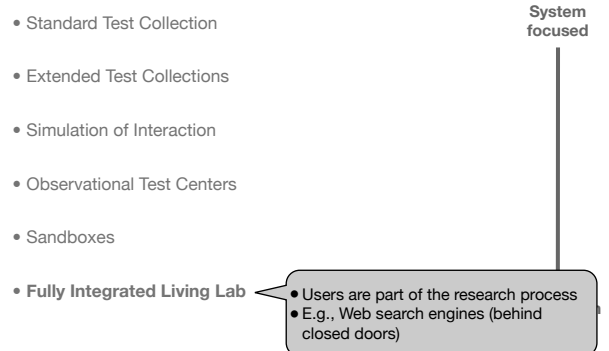
### Step towards developing a living lab



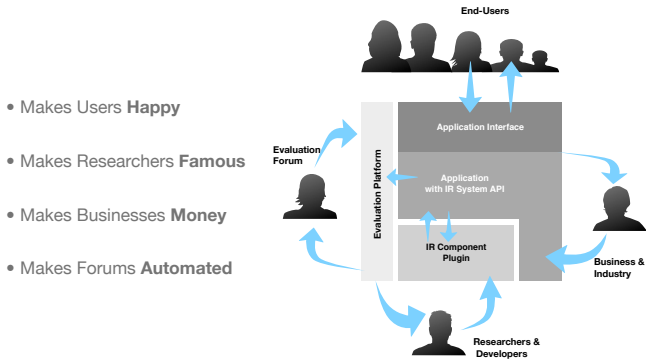
### Step towards developing a living lab



### Step towards developing a living lab

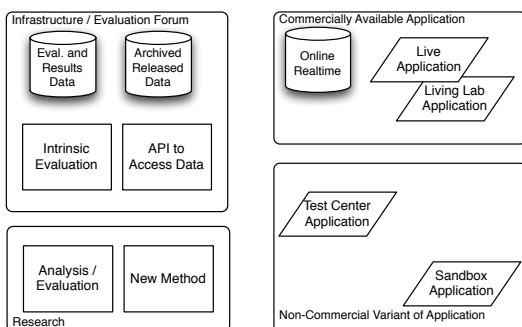


### An Ideal Living Lab

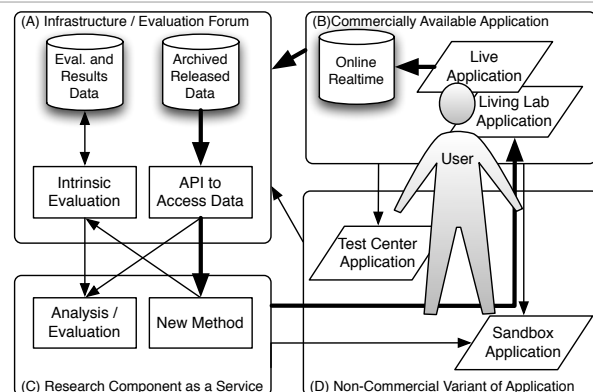


### A possible architecture for a living lab

### Infrastructure Components



### Architecture of Infrastructure



## Working towards a living lab for product evaluation

## Why product search?

- **Interesting set of tasks** that have not received much attention in current evaluation forums
- **Problem size and scale** is significantly more tractable than other tasks, e.g., web search
- **User privacy** is less problematic (i.e., can be made anonymous easily)
- Tasks have **direct economic implications**
- Provides an **incentive for smaller online retailers** to participate as they can benefit from R&D activity that they could not otherwise afford

## Product Related Search Tasks

- (Basic) product search
- Query suggestion
  - Query auto-completion
  - Query recommendation
- Product recommendation
  - Similar products
  - Related products

## Toy Example



Query auto-completion

Toys & Games - "helicopter"

Related Searches: helicopter remote control, rc helicopter, remote control helicopter

Showing 1 - 24 of 10,160 Results Sort by Popularity

<p><b>Syma S107/S107G R/C Helicopter - Blue</b>                  Box Price: <del>\$129.99</del> \$19.70                  \$7.99 from \$15.99                  Get it by <b>Tuesday, Sep 20</b> if you order in the next 23 hours and choose one-day shipping.                  Eligible for <b>FREE Super Saver Shipping</b>.                  Show only Syma items</p>	<p><b>Syma S107/S107G R/C Helicopter - Colors may vary</b>                  Box Price: <del>\$129.99</del> \$19.20                  \$8.99 from \$16.99                  Get it by <b>Tuesday, Sep 20</b> if you order in the next 24 hours and choose one-day shipping.                  Eligible for <b>FREE Super Saver Shipping</b>.                  Show only Syma items</p>	<p><b>Syma S107/S107G R/C Helicopter - Red</b>                  Box Price: <del>\$129.99</del> \$19.99                  \$2.99 from \$10.99                  \$2.99 from \$20.99                  Get it by <b>Tuesday, Sep 20</b> if you order in the next 24 hours and choose one-day shipping.                  Eligible for <b>FREE Super Saver Shipping</b>.                  Show only Syma items</p>
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## Product search

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## Query recommendation

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## Syma S107/S107G R/C Helicopter - Blue



by **Syma**  
 ★★★★★ (228 customer reviews) | **Like** (174)  
 List Price: ~~\$129.99~~  
 Price: **\$19.95** & eligible for **FREE Super Saver Shipping** on orders over \$25.  
 Details  
 You Save: \$110.04 (85%)  
**In Stock.**  
 We are not able to ship this item to your default shipping address. Sold by RC Toys Village and Fulfilled by Amazon. Gift-wrap available.  
 \$7.99 from \$15.99

## Customers Who Bought This Item Also Bought

<p><b>Full Set Replacement Parts for Syma S107 RC Helicopter, M...</b> by SYMA                  ★★★★★ (4)                  \$4.76</p>	<p><b>3.7V Li-po Battery for SYMA S107 Original Factory Replace...</b> by SYMA                  ★★★★★ (8)                  \$6.51</p>	<p><b>Replacement Set of Main Rotor Blades for Syma S107 RC Hel...</b> by Syma                  ★★★★★ (8)                  \$3.69</p>
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## Similar Items

<p><b>Syma S107/S107G R/C Helicopter - Red</b>                  ★★★★★ (276)                  \$129.99 <del>\$20.02</del>                  In Stock from <b>ExSky</b>.</p>	<p><b>Syma S107/S107G R/C Helicopter - Yellow</b>                  ★★★★★ (457)                  \$129.99 <del>\$19.64</del>                  In Stock from <b>Battery Superstore</b>.</p>
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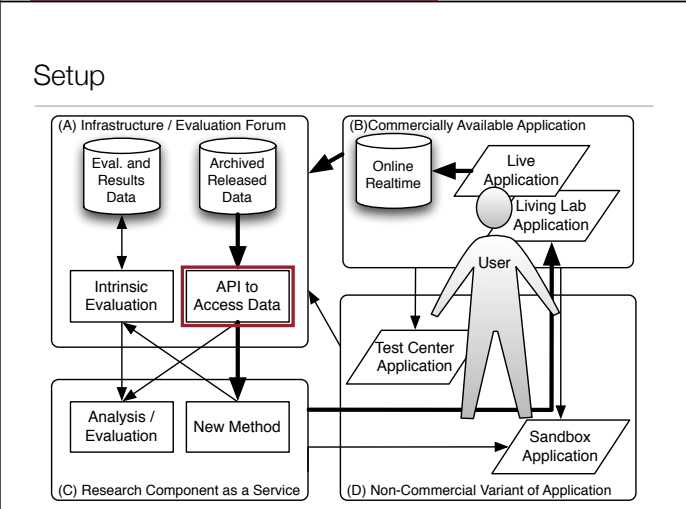
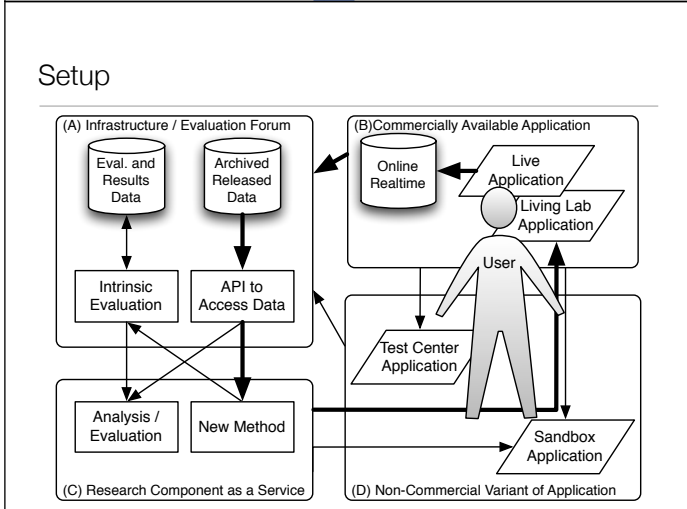
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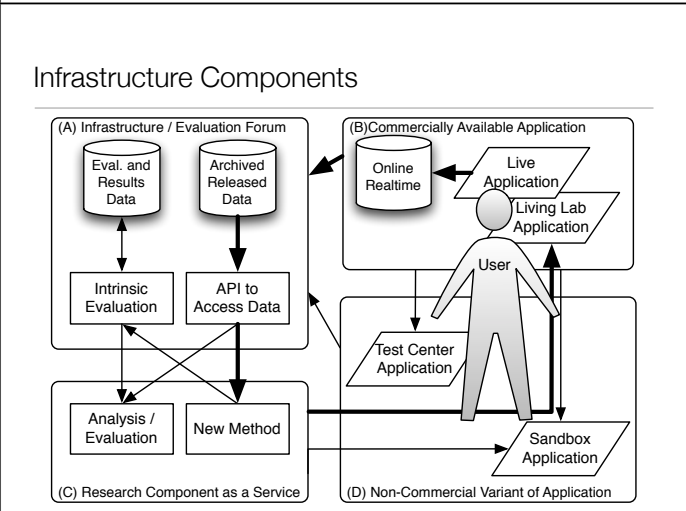
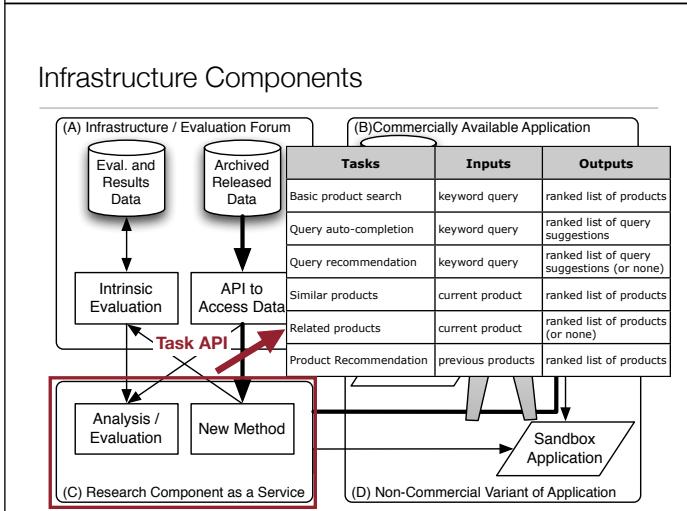
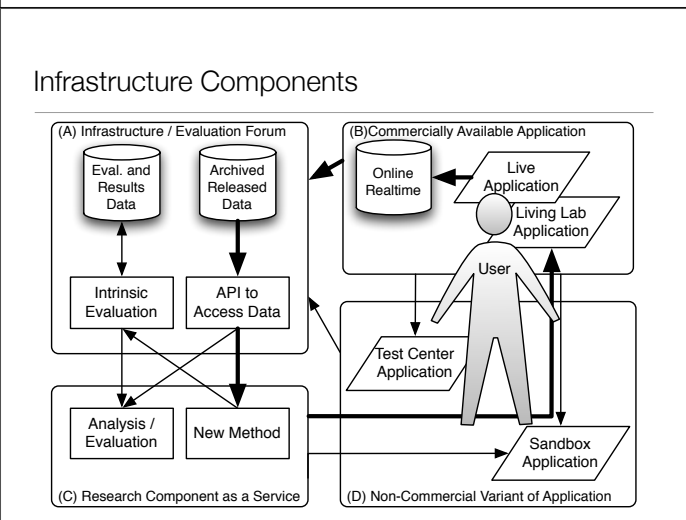
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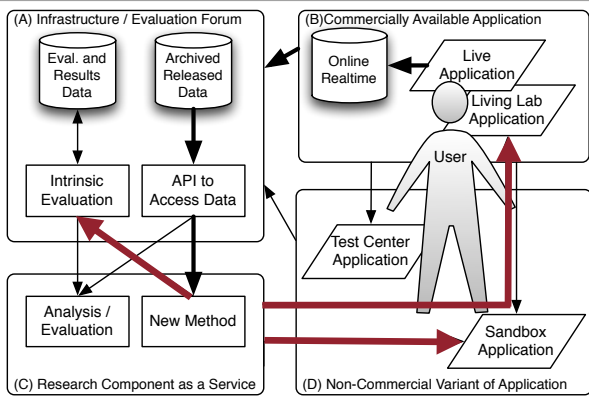
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 ⭐⭐⭐⭐ (457)  
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 In Stock from **Battuck Superstore**



- ### Data API
- Product information
    - List and properties of product, categories
    - Ratings, product reviews
  - Usage and query log
    - Queries and counts, follow-up queries, search results clicked
    - Product/category pages clicked, time spent on page
  - Anonymized user info
    - Pages visited, time spent on each, content of the shopping basket
    - (If user can be identified) previous purchases, favourited products
  - Trade log
    - Number of purchases for a given product
    - Cross-sales, most popular product



## Infrastructure Components



Wrapping up

## Challenges

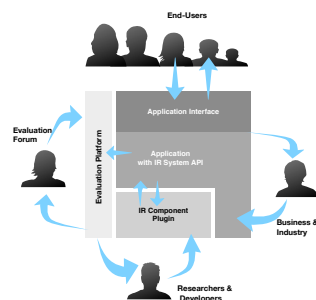
- **Legal** and **ethical** issues, i.e., user consent, ethical approval, releasing data, copyright, commercial sensitivity of data, trust)
- **Privacy** and **security** for end users and businesses
  - The (perceived) commercial value of the data exposed through an API may reduce the cooperation from business
- **Technical** issues
- **Operational** and **organisational** issues

## Benefits

- Evaluations could be undertaken using realistic data and interaction data would be available to analyse and study
- Evaluation would be more **user-focused** and more **business-focused**
- Academia will be able to show how their research is making an **impact**
- Provides a **clear route to commercialization**
- Businesses to have access to **R&D** they could not otherwise afford
- **Innovation cycle** could be **faster** and more **effective**

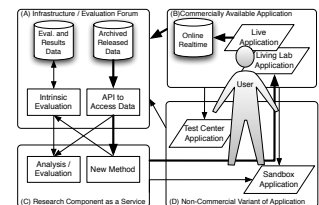
## Summary

- Provided a **definition for a living lab**
- Proposed a **system architecture for a living lab** based on web services
- Discussed the **benefits and challenges** of living labs
- Considered a **living lab evaluation platform for an online shopping scenario**



## Next steps: a product search track?

- Ascertain the **level of interest** within the community
- Getting the parties around the table
- **Devils in the details**
- **Start small**, i.e., can we “scale down” the vision, yet, still make it useful?



Questions?  
(Suggestions, comments, thoughts...)