

# KDI

## From Competence Queries to ER (a case study)

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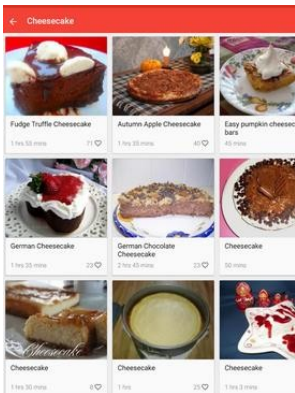


# Modeling recipes for online search

- by *Usashi Chatterjee, Fausto Giunchiglia, Devika P. Madalli, Vincenzo Maltese.*

- *ODBASE 2016 - The 15th International Conference on Ontologies, DataBases, and Applications of Semantics, Rhodes – October, 25-26 2016*

# Heterogeneity in Recipes Websites



... informal, heterogeneous, terminology, different schema...

# Heterogeneity in Recipes Websites

**Different Style:** Different recipe websites cover different content following their own style and standard

**Different Language:** Some websites offer recipes not only in English but in Italian, German or Hindi language.

**Variant Terminology:** myrecipes.com uses the term preparation, chow.com uses the term instruction, and kraftrecipes.com uses make it

Home > Recipes > Main Dish > Pasta > Chicken

## Cajun Chicken Pasta

★ 2K made

Recipe by: Carol Spradling

"Cajun cooking is a combination of Southern cuisine. It is robust, country style cooking. Enjoy this dish! Laissez le bon temp roulez and bon appetit!"

Save

### Ingredients

- 4 ounces linguine pasta
- 1 cup heavy cream
- 2 skinless, boneless chicken breasts, halved
- 1/8 teaspoon red hot chili
- 2 teaspoons Cajun seasoning
- 1/8 teaspoon lemon pepper
- 2 tablespoons butter
- 1/2 teaspoon salt
- 1 red bell pepper, sliced
- 1/8 teaspoon garlic powder
- 1 green bell pepper, sliced
- 1/8 teaspoon ground black pepper
- 4 fresh mushrooms, sliced
- 1/4 cup grated Parmesan cheese

Share Print

40 m 2 servings 935 cals

On Sale  
what's on sale near you.

## Cajun Chicken Pasta

★★★★★ 1751

### Related

Recipes Videos Categories Articles

Cajun Chicken Pasta  
★★★★★ 2K  
Recipe by Tammy Schill

Cajun Seafood Pasta  
★★★★★ 805  
Recipe by Star Pooley

Basil Chicken and Pasta  
★★★★★ 273  
Recipe by Stacey Adkins

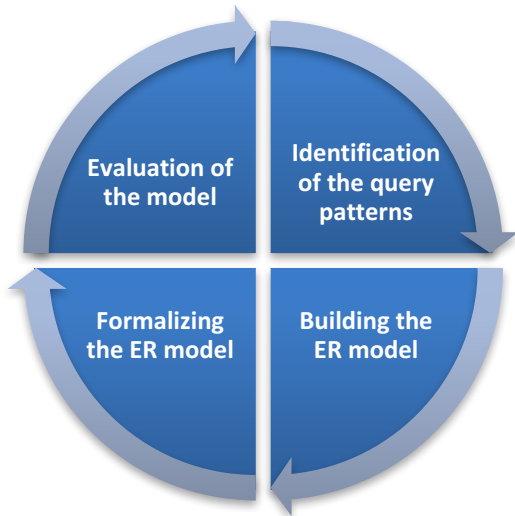
Chicken and Bowtie Pasta with Asiago Cream Sauce  
★★★★★ 194  
Recipe by THENEWTRICIA  
0 46 51

# The proposed solution

1 Propose a formalized entity-relationship(ER) model.

2 Modelling methodology is based on competency questions.

# The proposed solution – A Methodology



## Step 1: Identification of the query patterns

- Competency queries are collected
  - *Give me a recipe to prepare roasted turkey for Thanksgiving celebration*
- The queries are grouped in distinct scenarios
  - *Give me a recipe to prepare roasted turkey for Thanksgiving celebration.*
  - *Give me a recipe of halal food prepared for Iftar party.*
  - *Give me breakfast recipes.*

- Competency Question
  - *Give me a recipe to prepare roasted turkey for Thanksgiving celebration*
- Competency Question Analysis
  - Give me all Recipe for Dish X AND Event Y WHERE X.name= “roasted turkey” AND Y.name = “Thanksgiving” AND recipeIngredient = Z AND Z.type = “turkey” AND cookingMethod = “roasting”
- Identification Etypes and Properties
  - *Etypes: RECIPE, DISH, EVENT*
  - *Property: Dish.name, Event.name, recipeIngredient.type, Recipe.cookingMethod*

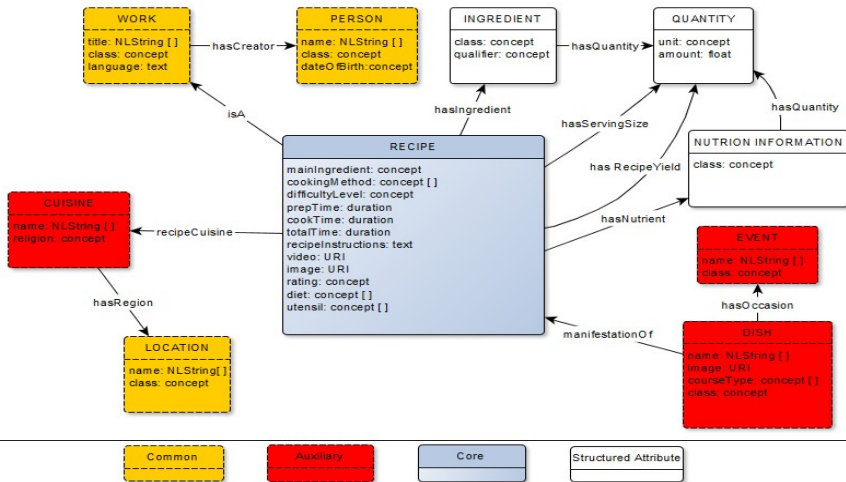


- Identification of the general query pattern
  - *Give me all recipes  $R$  which belong to cuisine  $C$  to prepare dish  $D$  appropriate for event  $E$*

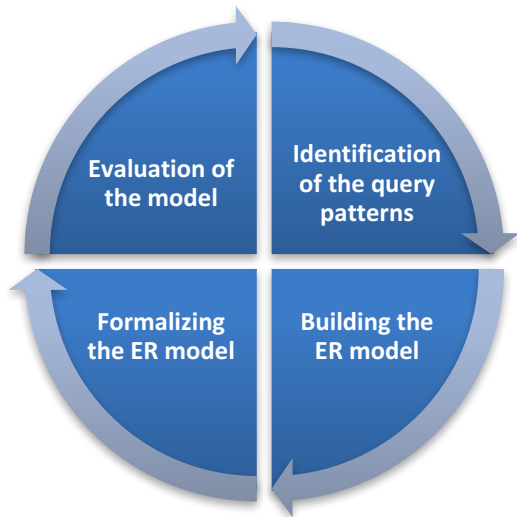
## Step 2: Building the recipe model

- **Common entity types**
  - *Those that can be (re-)used across domains*
- **Core entity types**
  - *Are those returned by the queries*
- **Auxiliary entity types**
  - *are those that in the general pattern determine how to filter results*

## Step 2: Building the recipe model

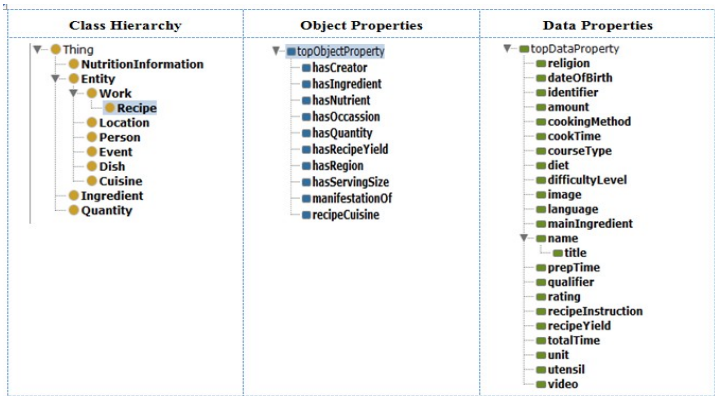


# The proposed solution – A Methodology



# Step 3: Formalization

- RDF as formal language
- Protégé standard free open source ontology editor



## Step 4: Evaluation of the Model

- Syntactic correctness and consistency
- Completeness and conciseness
- Empirical adequacy of the developed model

cooking.nytimes.com  
foodnetwork.com,  
eatingwell.com,  
allrecipes.com,  
sanjeevkapoor.com,  
food.ndtv.com.

## Step 5: Terminology comparison (example)

<a href="http://eatingwell.com">eatingwell.com</a>	Recipe model
Ingredients	INGREDIENT type qualifier unit amount
Preparation	recipeInstructions
Nutrition	NUTRITION INFORMATION type unit amount
Makes	SERVING SIZE unit amount
Active Time	prepTime
Total Time	totalTime
Health & Diet Considerations	Diet
Meal/Course	EVENT Type
Type of Dish	DISH courseType
Preparation/Technique	cookingMethod

## Schema.org ,BBC Food Ontology vs. Recipe Model Findings:

### ❗ *Incompleteness of properties*

Properties such as Recipe Creator and Recipe Rating is absent.

### ❗ *Lack of Types*

Schema.org and BBC Food Ontology does not associate recipes to specific event.

### ❗ *Underspecified properties*

Properties in [Schema.org](#) as plain text poses serious limitations to queries.

### ❗ *Lack of Structure*

[Schema.org](#) defines ingredient as text prevents it to answer queries related to quantities and qualifiers for ingredients.



# Highlights of the Proposed Model

- **Addressed the diversity problem in websites**  
*Definition of a formal ER model captures the fundamental queries to be offered*
- **The model is grounded in Library Science theories on creative works.**  
*Clear distinction between Recipe and Dish*
- **Overcomes the limitations of existing models**  
*Schema.org and BBC food ontology*