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Supporting a Process-Oriented Requirements Method

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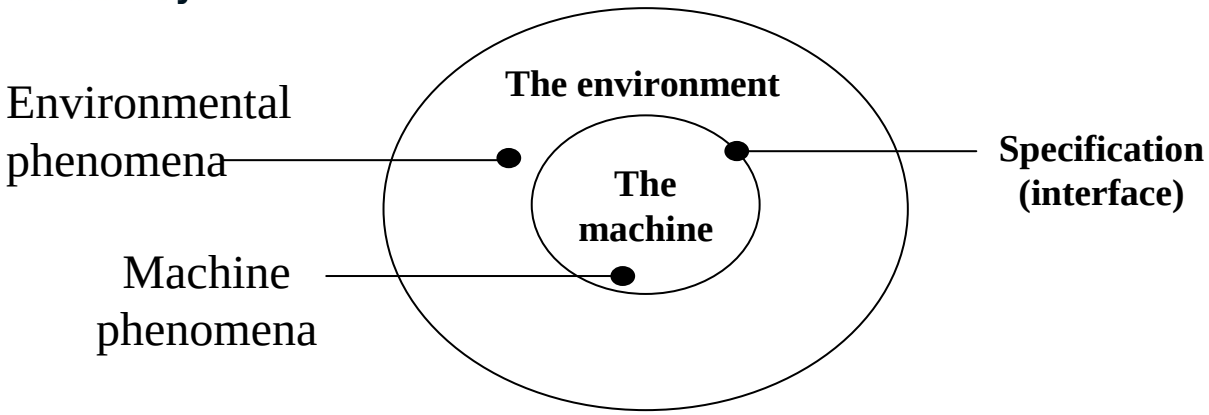
Outline for Today

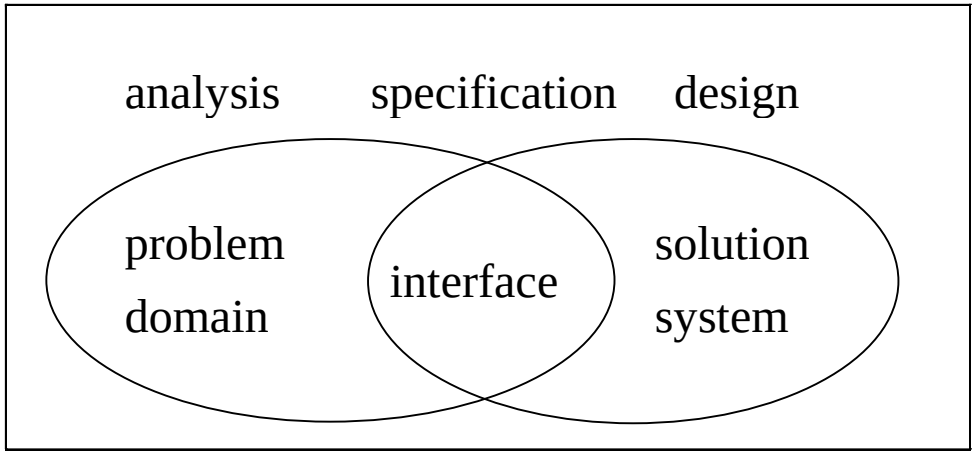
- Process Models
- Moving from Process Model to Specification
- Some Simple Approaches to Help (in this case)
- A Model Driven Perspective
- Situational Enterprise Applications
- Mashups
- Existing Tools for Situational Mashups
- Round-up
- EU FP7 SOA4All
- Resources for Building Mashup Applications

The problem in a nutshell

- Customers want systems to support their business processes. (We can argue about the b word).
- Developers build systems for clients.
- Often the following happens:
  - “Oh dear. The system doesn’t meet the client’s needs”.
- It must be someone’s fault
  - “The customer didn’t tell us what they wanted”
  - “The developers didn’t understand the problem”
- This is a *requirements* problem, and ***very*** common.
- Often a lack of alignment (business and IT)

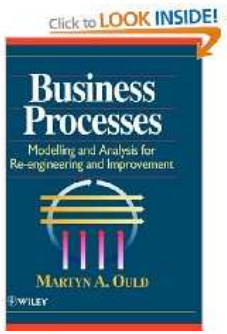
Terminology: Descriptions and phases

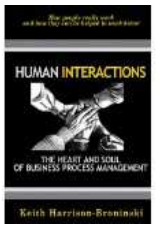


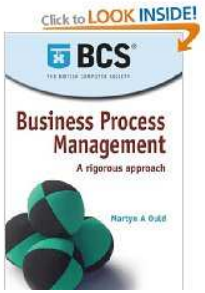


Role Activity Diagrams

- Original concepts in paper by Ould & Roberts (1986), book by Ould 1995 (a great read).
- Initially, promoted by Praxis & Coordination Systems (Roberts), and the DTI sponsored IOPTClub.
- Variants and extensions, e.g., PROCESS project (Southampton Uni, 94-97) produced families of models (mapping to CSP) and enactable models (RolEnact 98).
  - Phalp, K.T., G.K. Abeysinghe, P. Henderson, and R.J. Walters, (1998), RolEnact: Enactable Models of Business Processes, Information and Software Technology, vol. 40, num 3.
- Recent resurgence of interest, with popular books by Keith Harrison Broninski and Martin Ould (both BCS).
- Still supported by many, e.g., see Venice Consulting (Martin Ould's site), for much of interest.
  - www.veniceconsulting.co.uk







What do process actors need to know?

‘For an individual (or group) in the organisation to carry out their activities, they need to know what activities they must take part in, in what order those activities must take place, what other individuals or groups they must interact with, and which actions are dependent upon those interactions’.

Handy, C. (1976), ‘Understanding Organisations’, Penguin.

Role Based Models

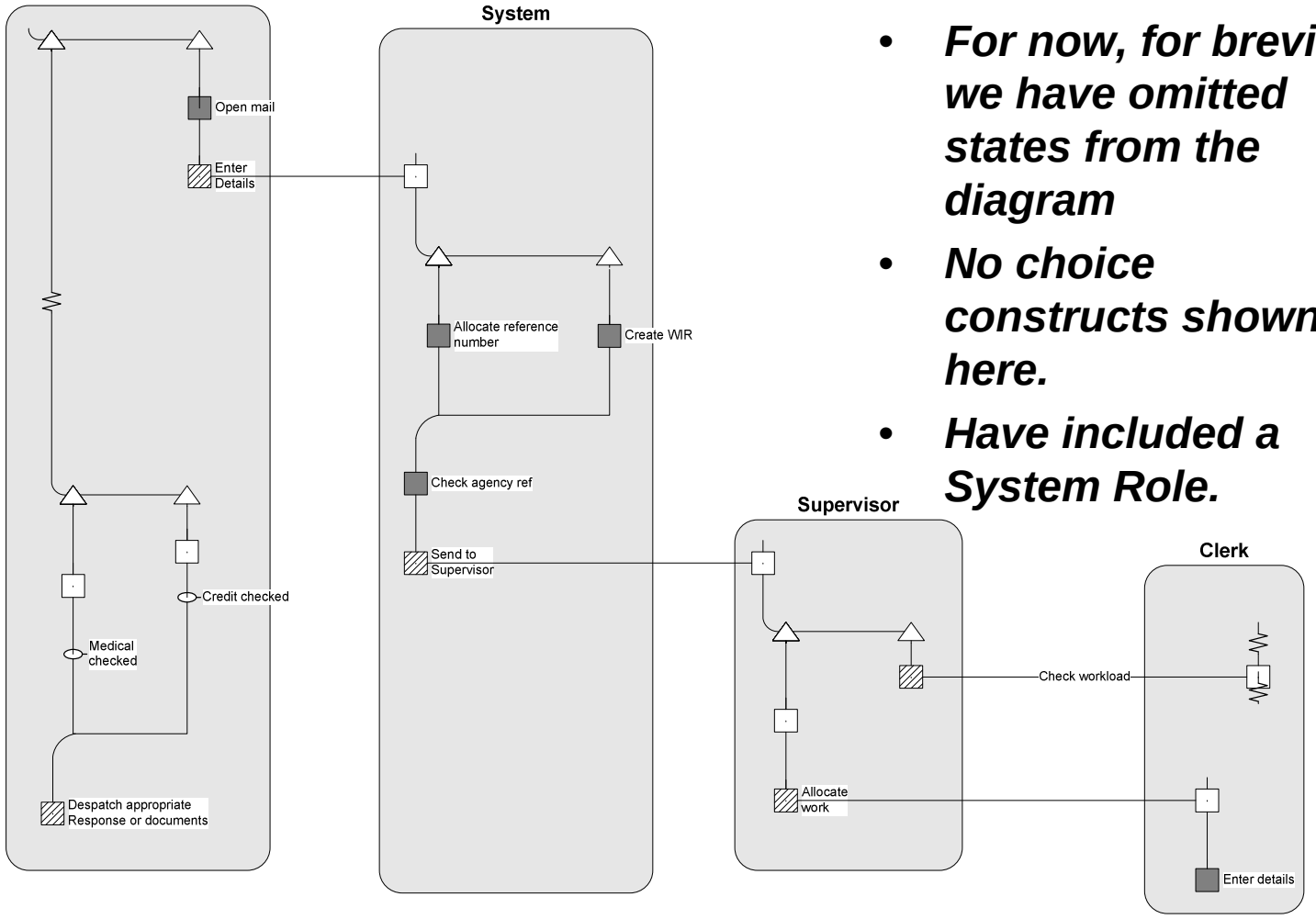
- ‘Role based models satisfy these requirements by grouping activities into ‘roles’, which describe the desired behaviour of individual groups, or systems’.

  Ould, M.A. (1992), An introduction to Process Modelling using RADs, in IOPTCLUB Practical Process Modelling, Mountbatten Hotel, Monmouth Street, Covent Garden, London.

- ‘A role involves a set of activities which, taken together, carry out a particular responsibility or set of responsibilities’.

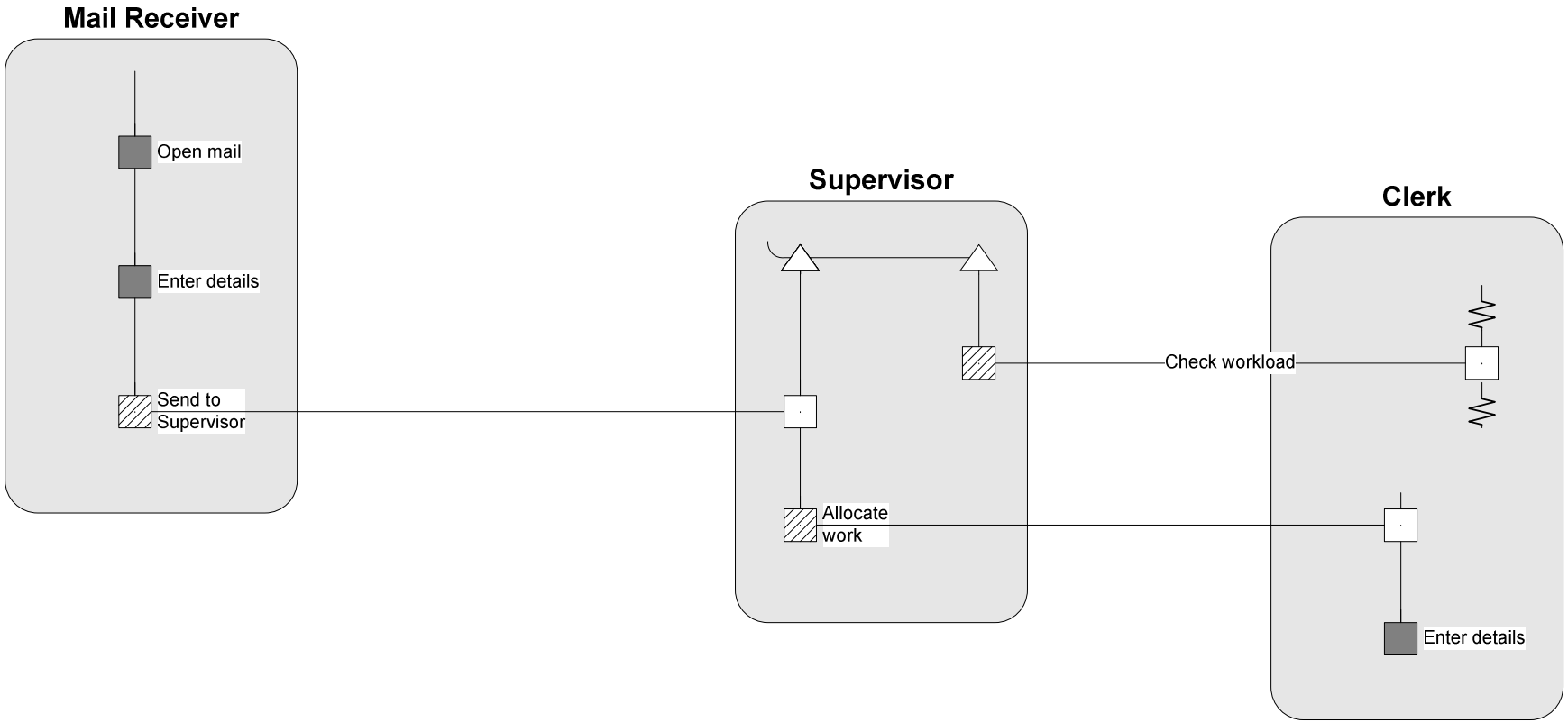
  Ould, M.A. (1995), Business Processes modelling and Analysis for Re-engineering and Improvement, John Wiley & Sons.

Role Activity Diagrams



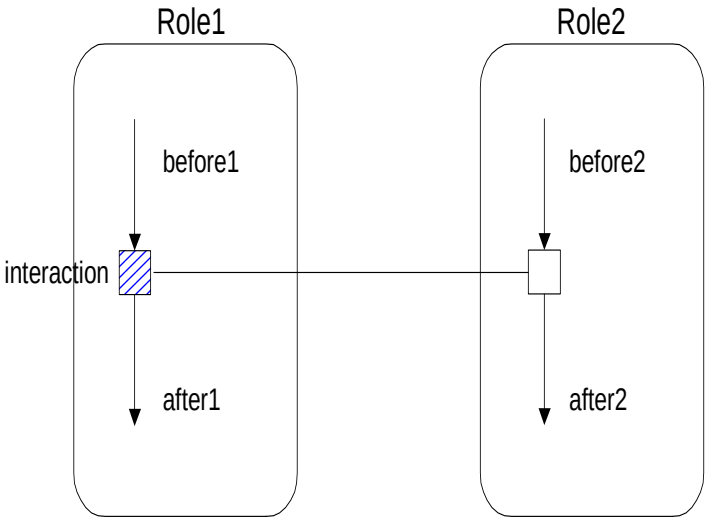
- ***For now, for brevity, we have omitted states from the diagram***
- ***No choice constructs shown here.***
- ***Have included a System Role.***

A ‘Purist’ RAD approach



The importance of *Interaction*

- Activity (or activities) carried out at the same point as another activity in another role (or roles).
- A shared event.
- The consequence of an interaction is that all of the roles involved move from their current state to their next state.
- Act as points of synchronisation (or control) of the process.
- Interactions are synchronous.



Issues in moving to specification

ISSUES

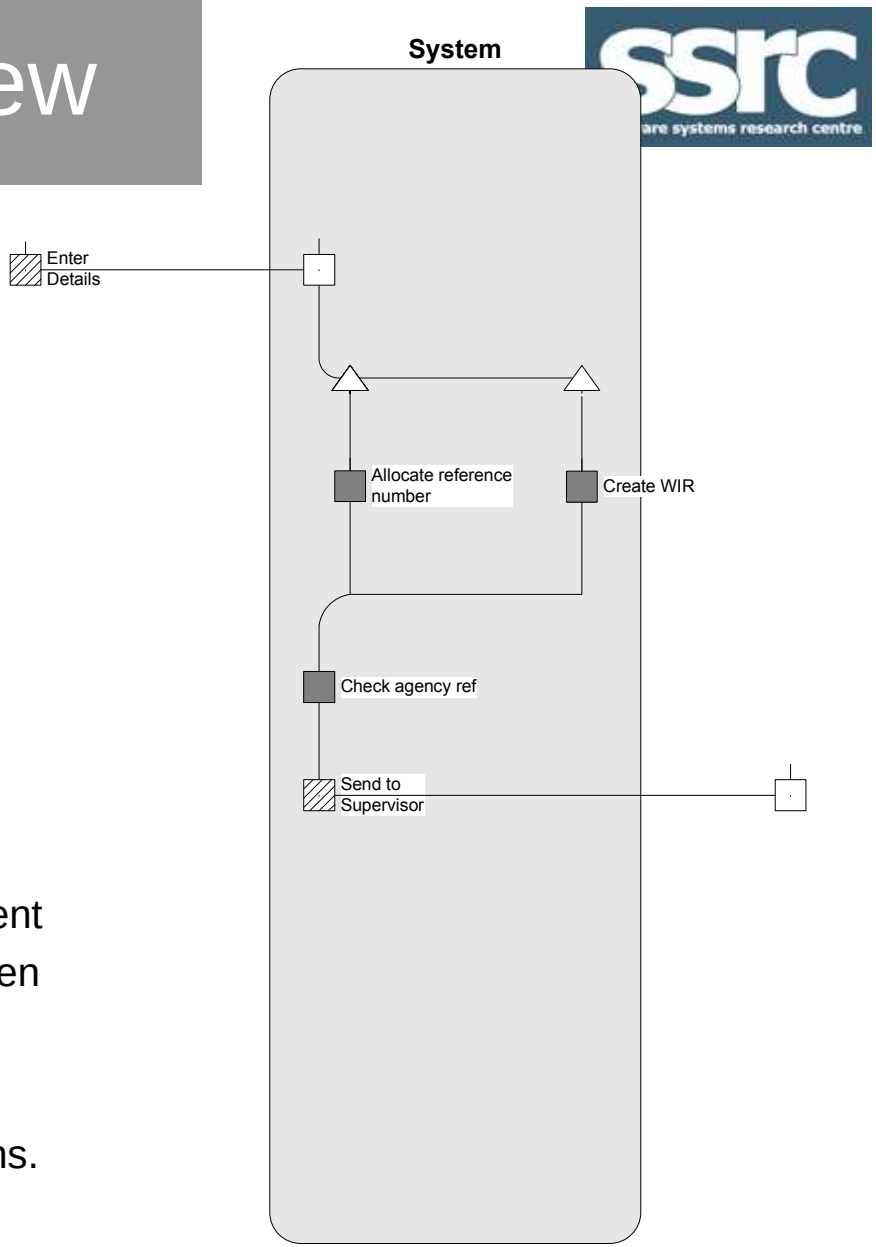
- Process models and software models have different perspectives and languages.
- For say RAD to use case, they can be considered almost orthogonal.
  - Activities assigned to roles versus actors (roles) assigned to processes.
- Hence difficult to preserve mapping in moving from process model to software.
  - In addition, there may be information loss if our software constructs are not sufficiently powerful (rich enough).

SOLUTIONS (lots of different ones of course)

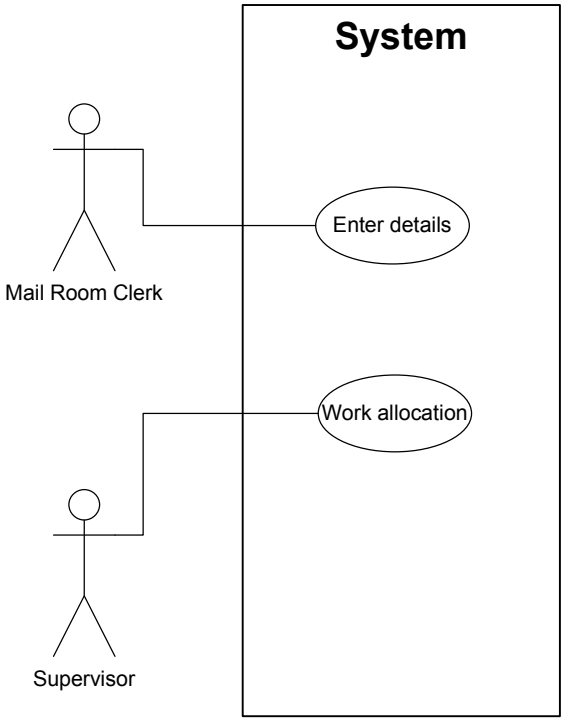
- A very thorough approach, which can be found in BSCP (Business Strategy Context Process) paper, moves from strategic view, using goal models, problem frames, and process models (Role Activity Diagrams).
  - S. Bleistein, K. Cox, J. Verner and K. Phalp (2006), B-SCP: a requirements analysis framework for validating strategic alignment of organisational IT based on strategy, context and process, Information and Software Technology, 48 (9), pp.846-868.
- Present here aspects of a lightweight view (often used in teaching), more pragmatic and accessible (simple notational devices).

Software View

- This is against the purist approach, and a rather simplified (teaching) example.
- We (as software engineers) move towards specification.
- Need to ensure that we capture the system boundary (as with say a Yourdon Context Diagram).
- Need to ensure that, in moving to spec, we show cross boundary (problem to machine interactions).
- With a system RAD (usually will have different sub-system names) the interaction is between the roles (which will be actors) and the system role.
- This will correspond to use case associations.



A simplified use case

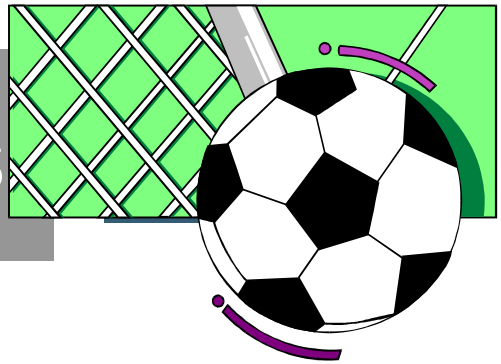


- Hence, RAD acts as a way to consider the problem domain (inform requirements).
- RAD (with system roles) allows one to ‘discover’ or discuss the system boundary.
- Acts as a link between business view (intentions for system) and IT.

Practical

- Acts as a checklist for the specification.
- Gives a first cut list for the use case diagram communications.
- Of course the meat (of the use case) is in the descriptions.

Two sporting use cases



1. The match reached full-time
2. The referee blew his/her whistle
3. The ball crossed the goal-line
4. The goal was not given

Alternatives

4. The goal was given

1. The match reached full-time
2. The referee blew his/her whistle
3. The ball crossed the goal-line
4. The goal was given

Alternatives

4. The goal was not given

Validation & Context. Someone who 'knows the the game'.

Parallel: RAD and Use Case

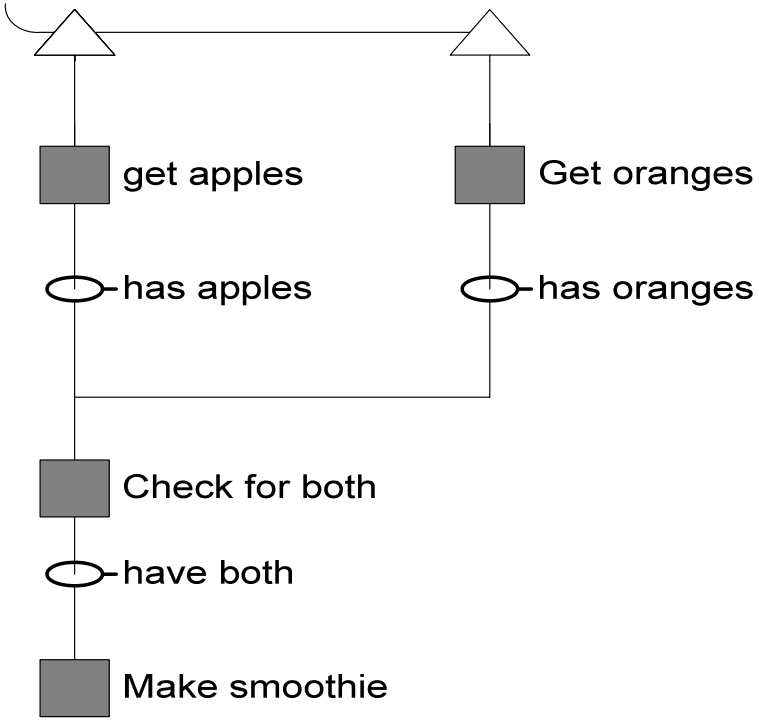
Suppose our event is now *Make smoothie*, which requires that when we have fruit.
We actually have both apples and oranges.

For a use case we would be required to choose that the gaining of apples and oranges occurs in some arbitrary sequence. That is:

1 Fruit Finder get apples
2 Fruit Finder get oranges

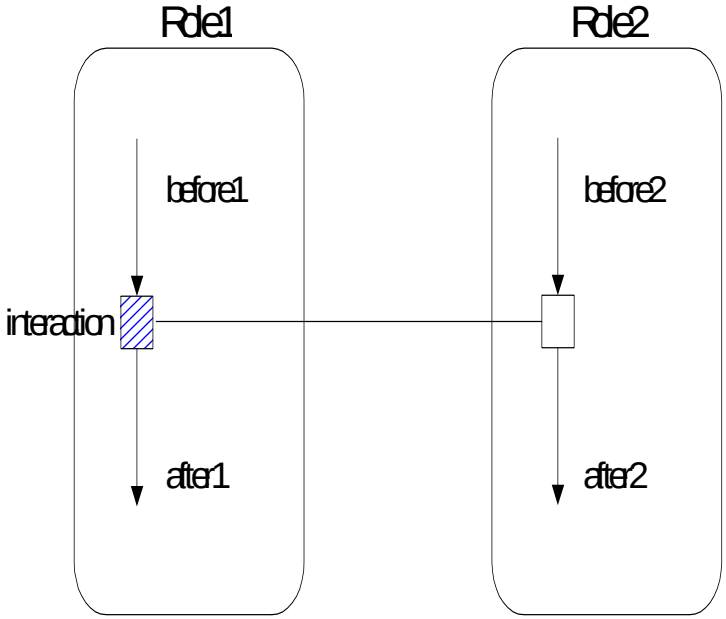
However, in reality one might gather these fruits independently and in any, often unknown order.

Also within the Use Case description the dependencies are unclear



Kanyaru, J.M. and Phalp, K. (2009), Validating software requirements with enactable use case descriptions, Requirements Engineering Journal, 14: 1, Feb 2009

Three Notations




```
Interaction Role1.Interaction
Me(before1 → after1)
Role2(before2 →  after2)
End
```

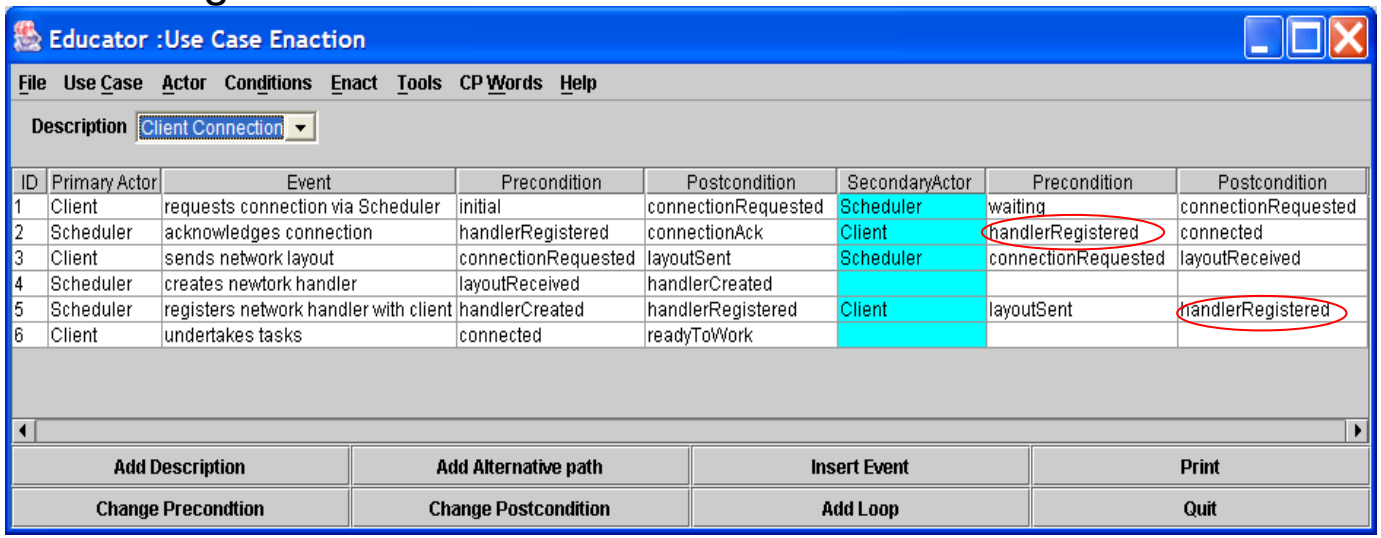
```
Interaction Keith.gives_pen
        Me (has_pen -> no_pen)
        Sherry (no_pen -> has_pen)
End
```

Actor	***Event***	***pre***	***post***	***Actor 2***	***pre***	***post***
Keith	gives pen	has pen	no pen	Sherry	no pen	has pen

Considering dependencies

1. Client requests connection via Schedule
2. Scheduler acknowledges connection
3. Client sends network layout
4. Scheduler creates network handler
5. Scheduler registers network handler
6. Client starts executing its tasks

- *Produces an enaction.*
- *States controlling which events can be invoked.*
- *Allows stakeholders to experiment with behaviour.*



Supports description guidelines

- **Style 3 (contd.)**
    - *The patient stands next to the doctor.*
    - *He puts the prescription in his pocket.*
  - Who is “he”? Whose pocket is “his”? Write proper nouns / names instead:
    - *The doctor puts the prescription in the patient’s pocket.*
    - *The GP puts the prescription in the customer’s pocket.*
  - This sentence is at fault because it uses synonyms (GP for doctor and customer for patient). Only use the agreed language of the domain since a synonym does not convey the same meaning.

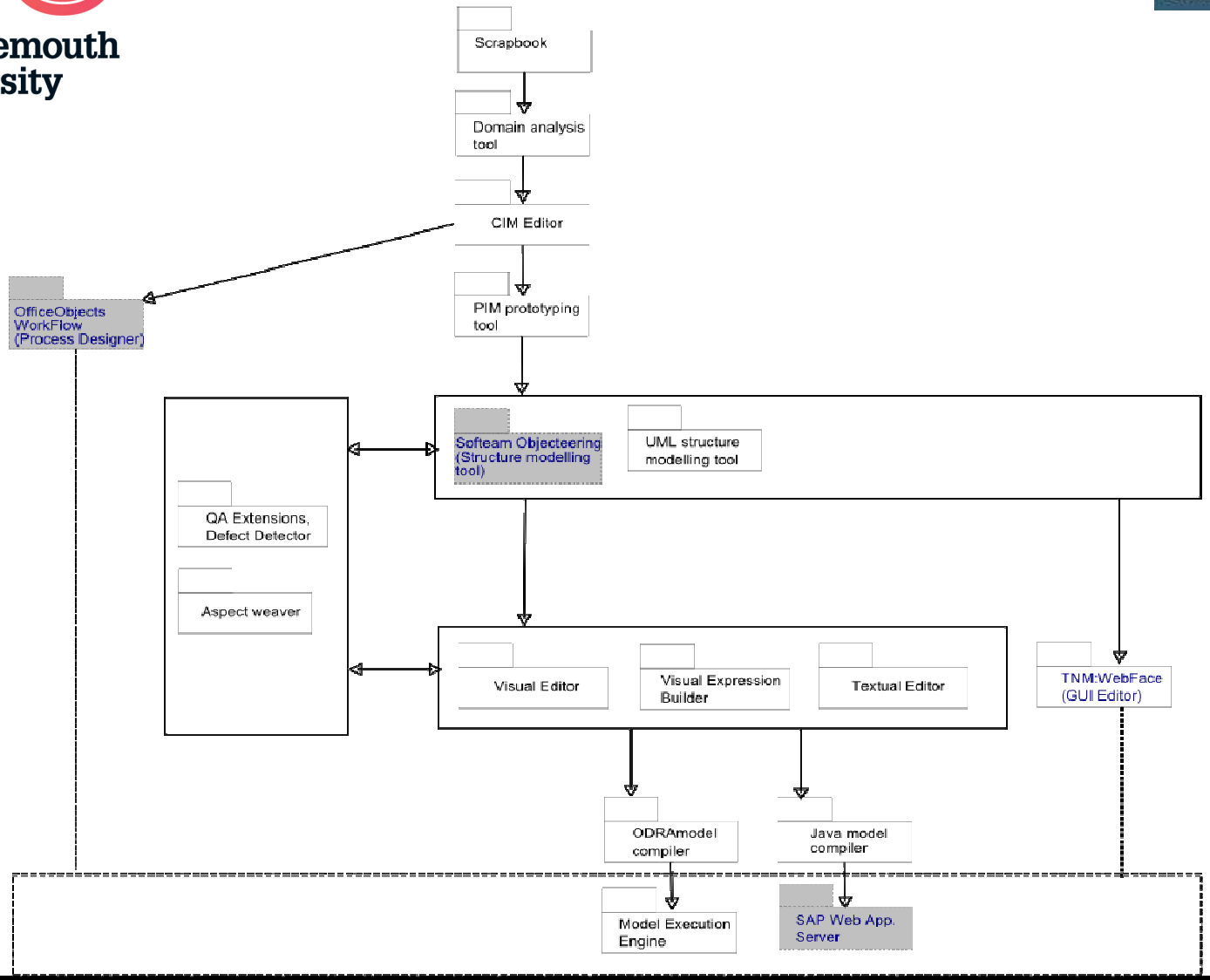
An MDA Approach

- One in-house approach has versions of RADs (environment, shared and machine RAD), which are then transformed (via rules) to UML models (class diagram), activity diagrams and use cases.
- Similar idea to the system roles.
- More rigorous (but requires sets of models)
- Allows for direct transformation (stronger alignment).
- Well received by our final years (but then they are Computing and BIT students – so amenable to software models and MDA).
- Rules can be applied as guidelines too (written), or codified.
- However, not clear that this is sufficiently accessible, *which leads to our work on accessible models (part of VIDE).*

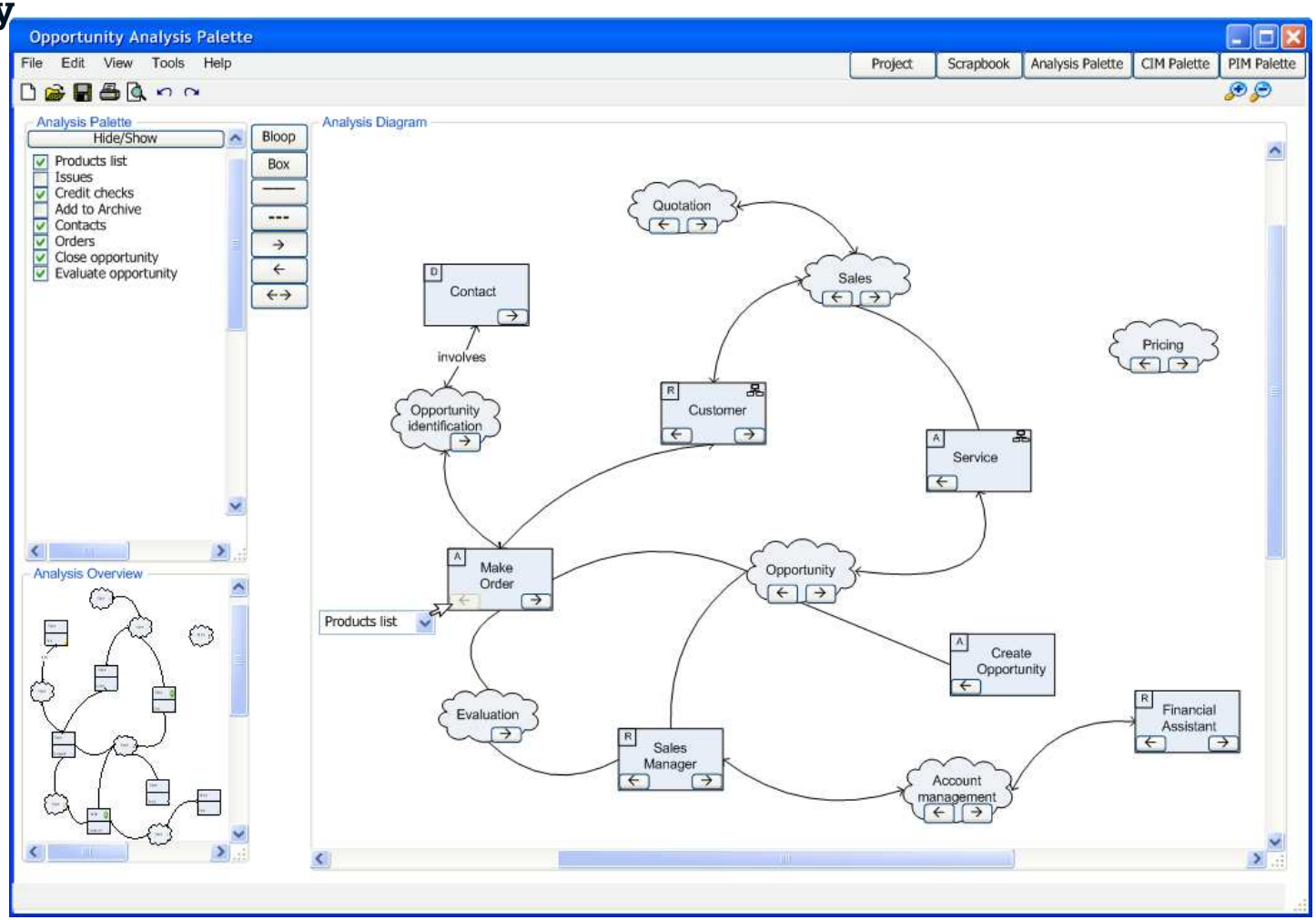
VIDE Project

- **VIDE – Visual Model Driven Development**
- European Commission funded €2,298,436 ($2.95 million).
- To make model driven development fulfil business needs.
- To create novel tools to support model driven development, and to provide an end-to-end development process supported by visual notations.
- 10 partners including: SAP, 2 divisions of Fraunhofer, Softeam and Rodan (tool developers).
- BU focus specifically on accessibility of notation, particularly at the CIM level.
- Simple mechanisms (scrapbook, bloops) and wizards to support transformations (e.g., BPMN to Class diagram).

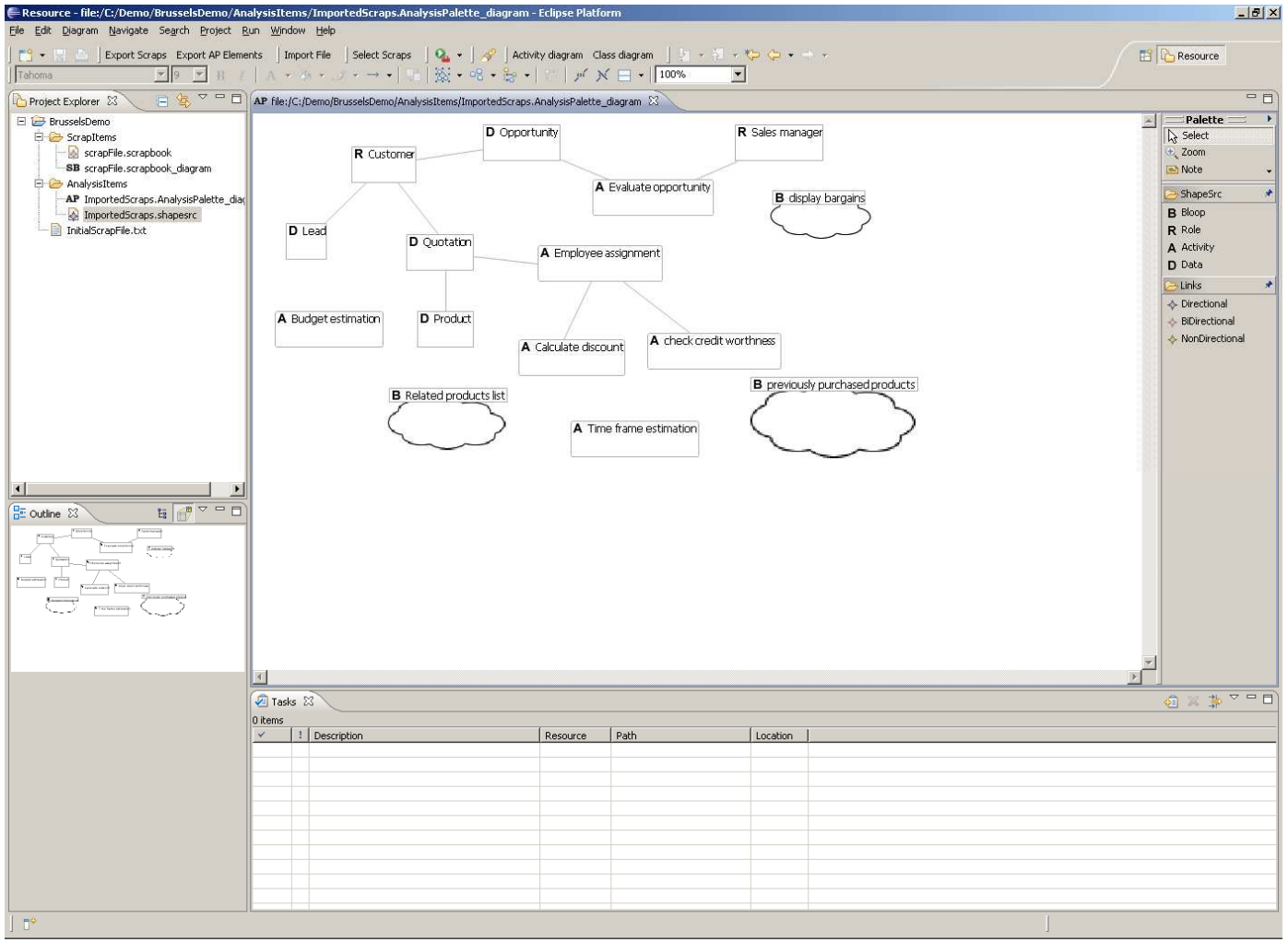
Research within VIDE



Design stage - initial opportunity scenario



Prototype implementation using Eclipse



Recap: The Story so far

- Role models (RADs) help to inform requirements.
- Issues in moving to specification (from RADs to use cases) can be mitigated by simple notational additions.
- For model driven approaches guidance becomes transformation rules (from RADs to UML models).
- Require an accessible (alignment focussed) MDA approach
- The VIDE (MDA tool) is helpful and accessible, but large investment is required in tooling etc, *and very much an application based approach (even though framework based)*.
- Need to consider how other technologies and approaches can help in this space, particularly for the SME.
- *Process oriented mashups may provide the equivalent to VIDE but from a different, web services, perspective.*

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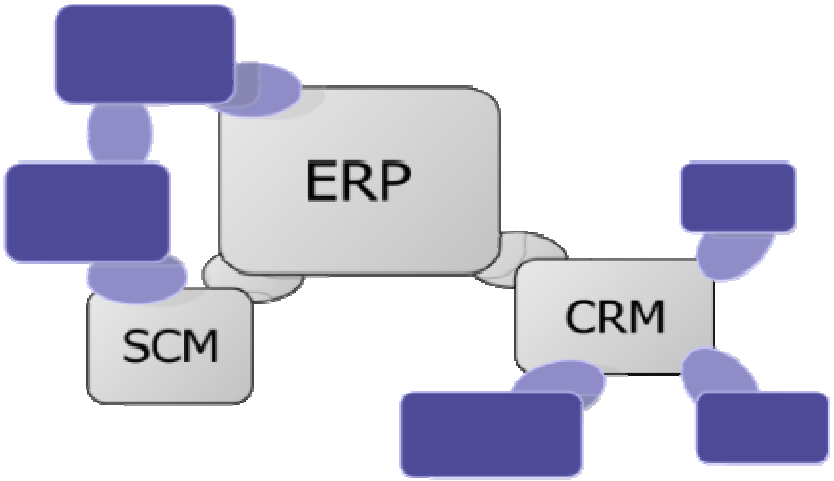
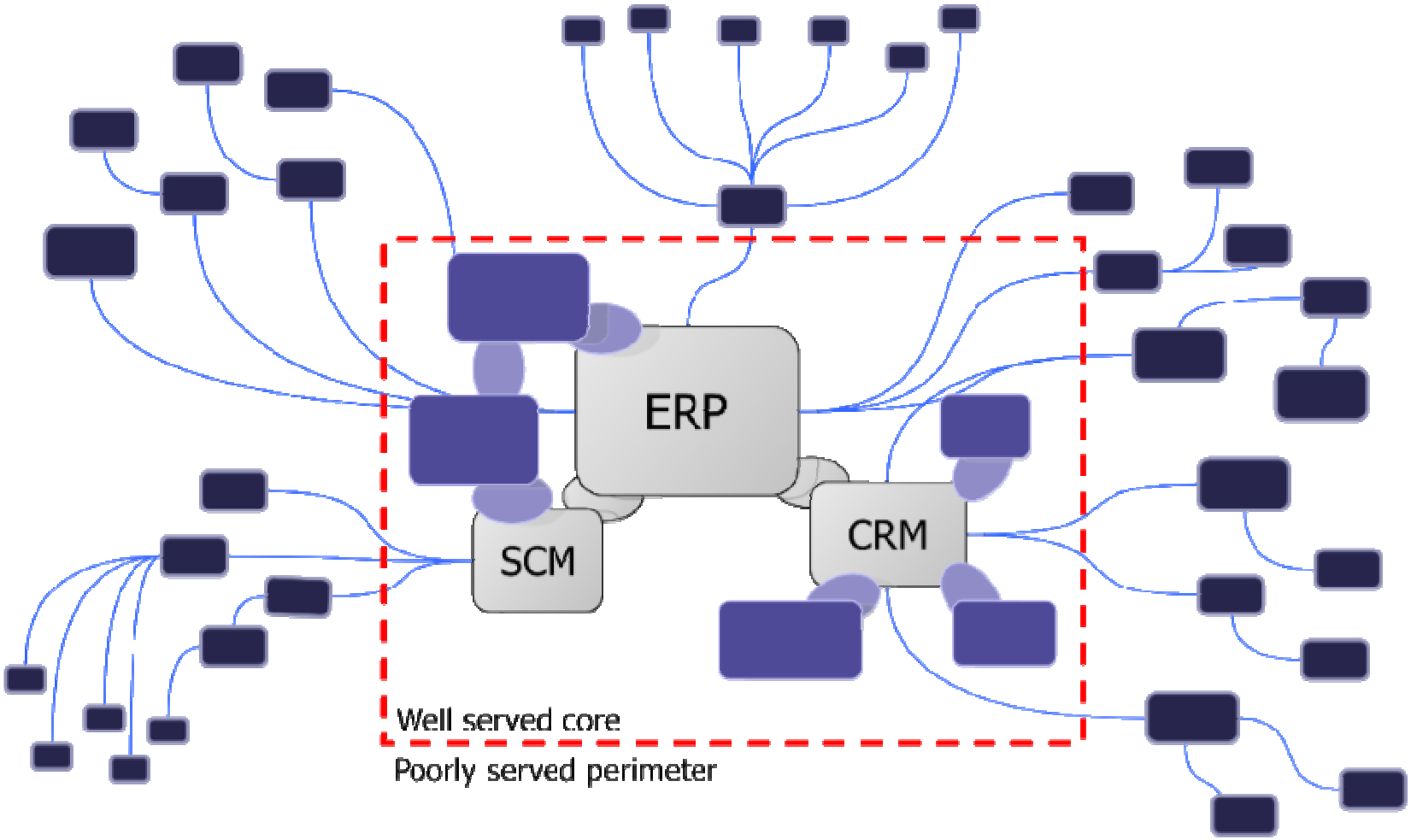
Enterprise Information Systems



Characteristics of traditional enterprise systems

- **Closed**
- **Centralized control**
- **Mission critical**

Enterprise information system landscape



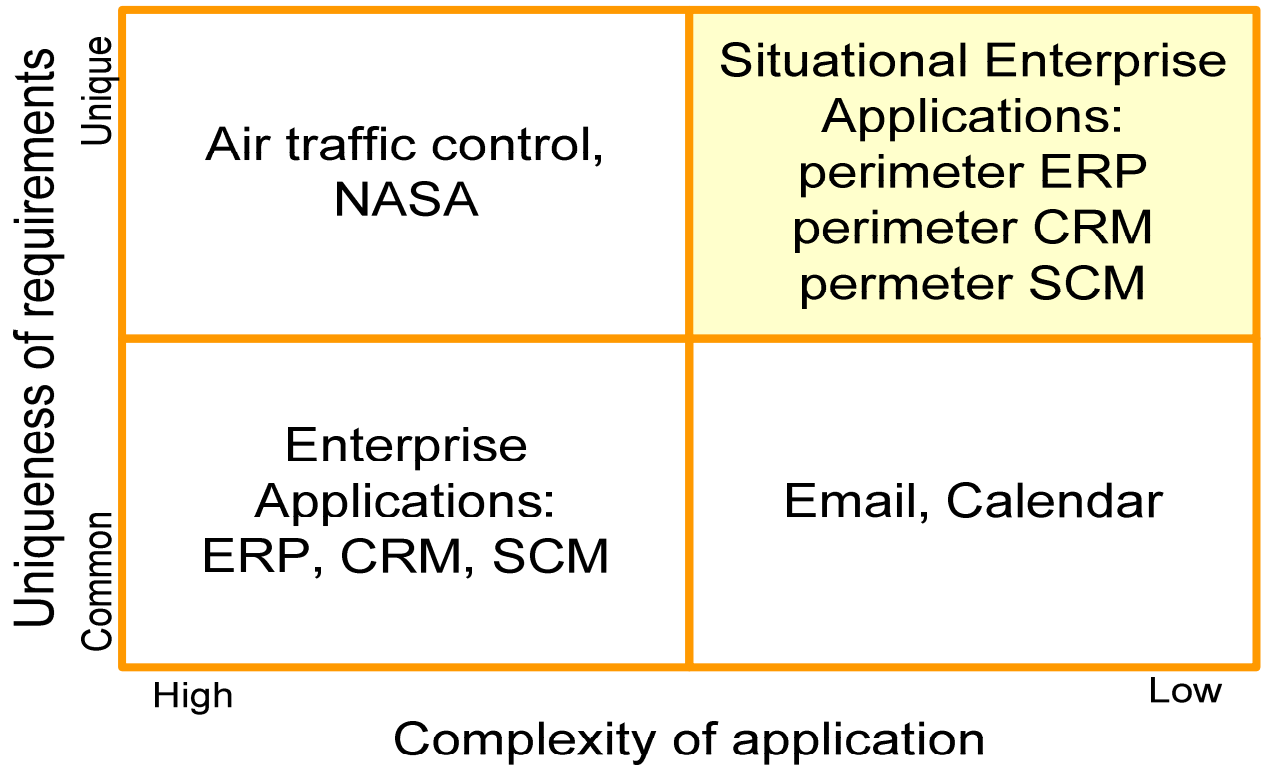
Requirements of Supporting Situational Enterprise Applications

An enterprise needs to be able to *quickly and cost-effectively change* how it does business and who it does business with (suppliers, business partners, customers), etc.

“Yes, we can!“
Empowering the Non-Technical Business Users

Source: Kevin Quinn. Not Everyone Who Drives a Car Fixes It Themselves -Strategic Information Infrastructure. http://www.dmreview.com/news/1041222-1.html, November 2005.

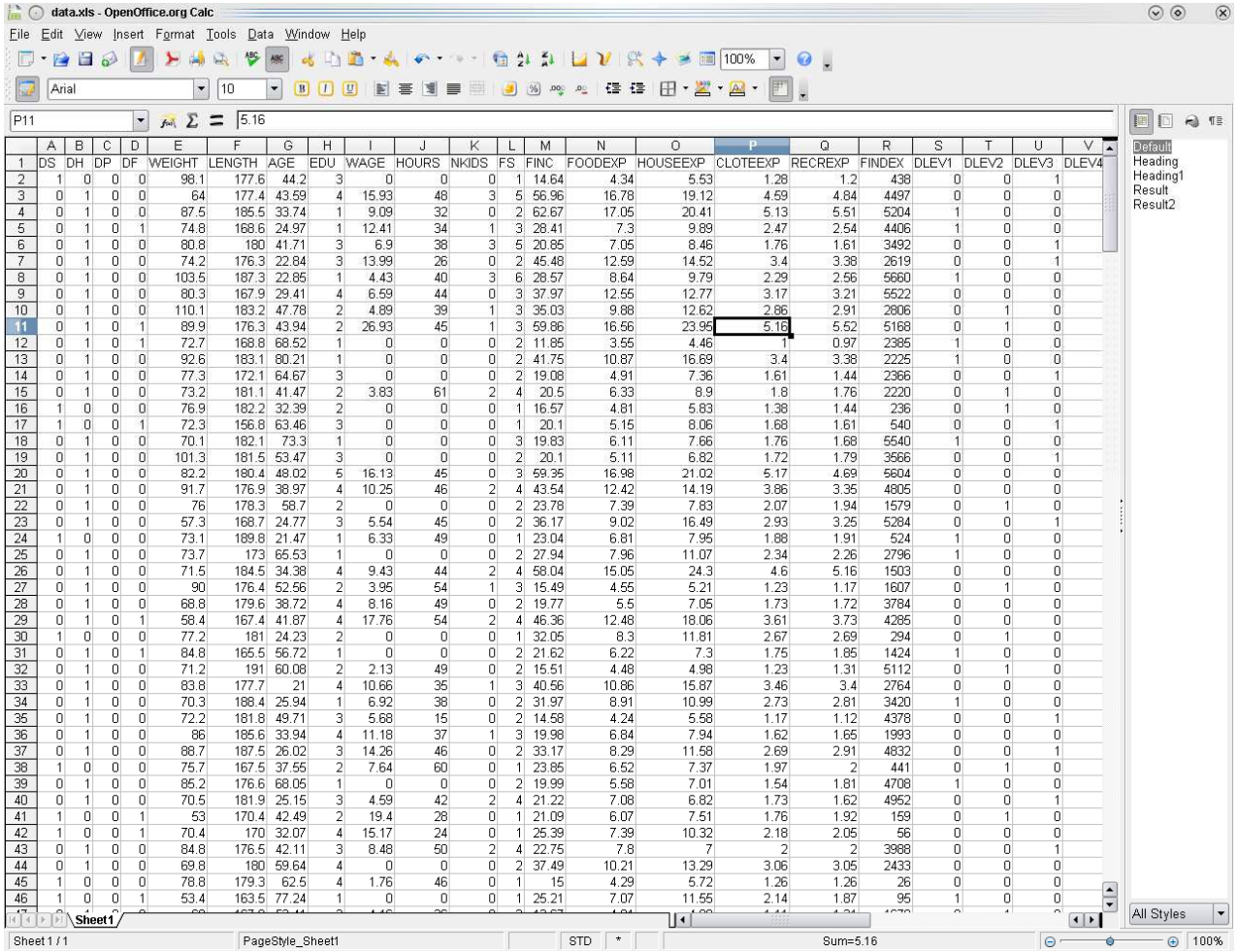
Situational Enterprise Applications in the Application Universe



Examples of Situational Applications

- Excel → spreadsheets
- Access → simple databases
- Visual basic for applications → small office-based applications
- .....

The Most Famous Situational Application



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	DS	DH	DP	DF	WEIGHT	LENGTH	AGE	EDU	WAGE	HOURS	NKIDS	FS	FINC	FOODEXP	HOUSEEXP	CLOTEEXP	RECREXP	FINDEX	DLEV1	DLEV2	DLEV3	DLEV4
2	1	0	0	0	98.1	177.6	44.2	3	0	0	0	1	14.64	4.34	5.53	1.28	1.2	438	0	0	1	
3	0	1	0	0	64	177.4	43.59	4	15.93	48	3	5	56.96	16.78	19.12	4.59	4.84	4497	0	0	0	
4	0	1	0	0	87.5	185.5	33.74	1	9.09	32	0	2	62.67	17.05	20.41	5.13	5.51	5204	1	0	0	
5	0	1	0	1	74.8	168.6	24.97	1	12.41	34	1	3	28.41	7.3	9.89	2.47	2.54	4406	1	0	0	
6	0	1	0	0	80.8	180	41.71	3	6.9	38	3	5	20.85	7.05	8.46	1.76	1.61	3492	0	0	1	
7	0	1	0	0	74.2	176.3	22.84	3	13.99	26	0	2	45.48	12.59	14.52	3.4	3.38	2619	0	0	1	
8	0	1	0	0	103.5	187.3	22.85	1	4.43	40	3	6	28.57	8.64	9.79	2.29	2.56	5660	1	0	0	
9	0	1	0	0	80.3	167.9	29.41	4	6.59	44	0	3	37.97	12.55	12.77	3.17	3.21	5522	0	0	0	
10	0	1	0	0	110.1	183.2	47.78	2	4.89	39	1	3	35.03	9.88	12.62	2.86	2.91	2806	0	1	0	
11	0	1	0	1	89.9	176.3	43.94	2	26.93	45	1	3	59.86	16.56	23.95	5.16	5.52	5168	0	1	0	
12	0	1	0	1	72.7	168.8	68.52	1	0	0	0	2	11.85	3.55	4.46	1	0.97	2385	1	0	0	
13	0	1	0	0	92.6	183.1	80.21	1	0	0	0	2	41.75	10.87	16.69	3.4	3.38	2225	1	0	0	
14	0	1	0	0	77.3	172.1	64.67	3	0	0	0	2	19.08	4.91	7.36	1.61	1.44	2366	0	0	1	
15	0	1	0	0	73.2	181.1	41.47	2	3.83	61	2	4	20.5	6.33	8.9	1.8	1.76	2220	0	1	0	
16	1	0	0	0	76.9	182.2	32.39	2	0	0	0	1	16.57	4.81	5.83	1.38	1.44	236	0	1	0	
17	1	0	0	1	72.3	156.8	63.46	3	0	0	0	1	20.1	5.15	8.06	1.68	1.61	540	0	0	1	
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19	0	1	0	0	101.3	181.5	53.47	3	0	0	0	2	20.1	5.11	6.82	1.72	1.79	3566	0	0	1	
20	0	1	0	0	82.2	180.4	48.02	5	16.13	45	0	3	59.35	16.98	21.02	5.17	4.69	5604	0	0	0	
21	0	1	0	0	91.7	176.9	38.97	4	10.25	46	2	4	43.54	12.42	14.19	3.86	3.35	4805	0	0	0	
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23	0	1	0	0	57.3	168.7	24.77	3	5.54	45	0	2	36.17	9.02	16.49	2.93	3.25	5284	0	0	1	
24	1	0	0	0	73.1	189.8	21.47	1	6.33	49	0	1	23.04	6.81	7.95	1.88	1.91	524	1	0	0	
25	0	1	0	0	73.7	173	65.53	1	0	0	0	2	27.94	7.96	11.07	2.34	2.26	2796	1	0	0	
26	0	1	0	0	71.5	184.5	34.38	4	9.43	44	2	4	58.04	15.05	24.3	4.6	5.16	1503	0	0	0	
27	0	1	0	0	90	176.4	52.56	2	3.95	54	1	3	15.49	4.55	5.21	1.23	1.17	1607	0	1	0	
28	0	1	0	0	68.8	179.6	38.72	4	8.16	49	0	2	19.77	5.5	7.05	1.73	1.72	3784	0	0	0	
29	0	1	0	1	58.4	167.4	41.87	4	17.76	54	2	4	46.36	12.48	18.06	3.61	3.73	4285	0	0	0	
30	1	0	0	0	77.2	181	24.23	2	0	0	0	1	32.05	8.3	11.81	2.67	2.69	294	0	1	0	
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32	0	1	0	0	71.2	191	60.08	2	2.13	49	0	2	15.51	4.48	4.98	1.23	1.31	5112	0	1	0	
33	0	1	0	0	83.8	177.7	21	4	10.66	35	1	3	40.56	10.86	15.87	3.46	3.4	2764	0	0	0	
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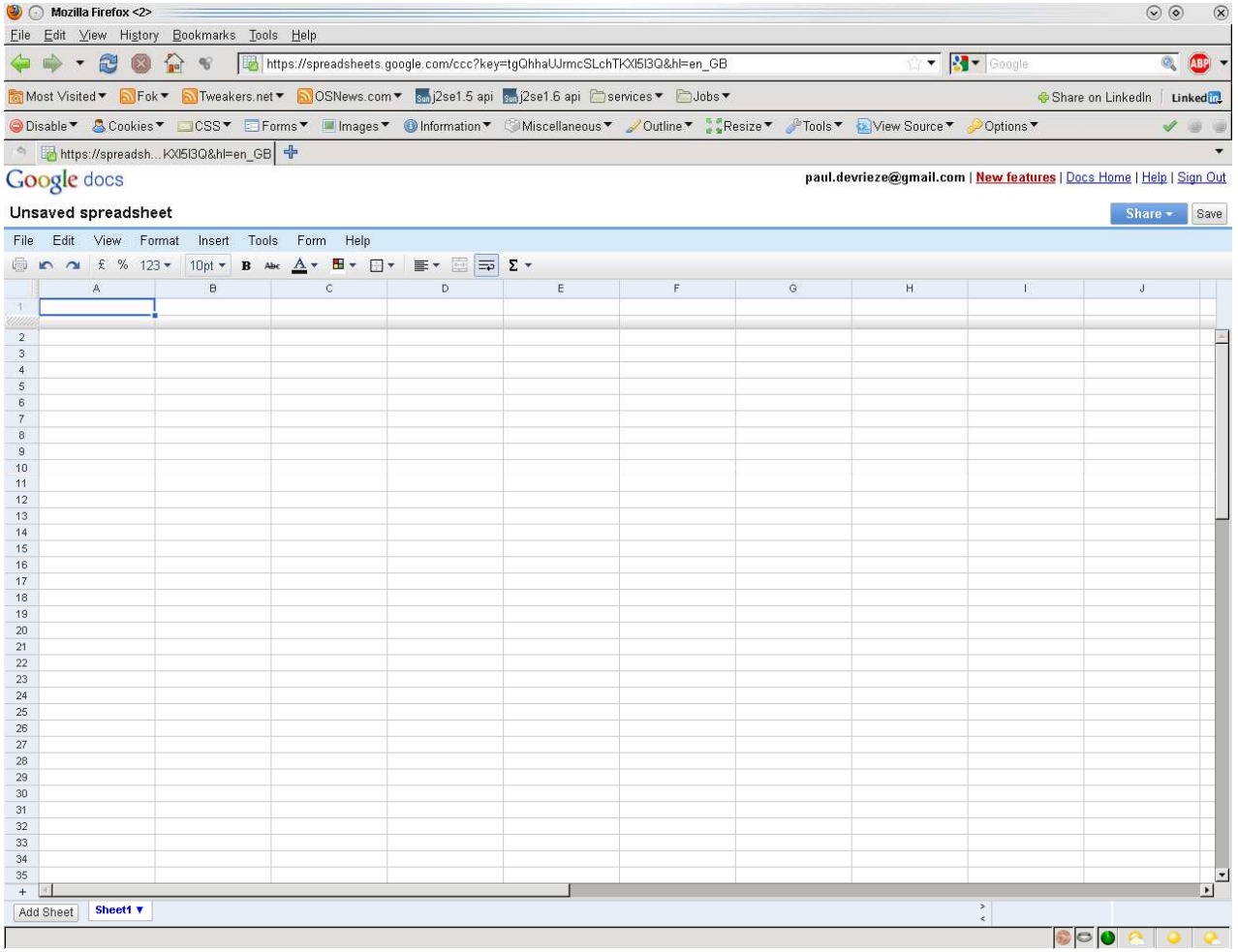
35	0	1	0	0	72.2	181.8	49.71	3	5.68	15	0	2	14.58	4.24	5.58	1.17	1.12	4378	0	0	1	
36	0	1	0	0	86	185.6	33.94	4	11.18	37	1	3	19.98	6.84	7.94	1.62	1.65	1993	0	0	0	
37	0	1	0	0	88.7	187.5	26.02	3	14.26	46	0	2	33.17	8.29	11.58	2.69	2.91	4832	0	0	1	
38	1	0	0	0	75.7	167.5	37.55	2	7.64	60	0	1	23.85	6.52	7.37	1.97	2	441	0	1	0	
39	0	1	0	0	85.2	176.6	68.05	1	0	0	0	2	19.99	5.58	7.01	1.54	1.81	4708	1	0	0	
40	0	1	0	0	70.5	181.9	25.15	3	4.59	42	2	4	21.22	7.08	6.82	1.73	1.62	4952	0	0	1	
41	1	0	0	1	53	170.4	42.49	2	19.4	28	0	1	21.09	6.07	7.51	1.76	1.92	159	0	1	0	
42	1	0	0	1	70.4	170	32.07	4	15.17	24	0	1	25.39	7.39	10.32	2.18	2.05	56	0	0	0	
43	0	1	0	0	84.8	176.5	42.11	3	8.48	50	2	4	22.75	7.8	7	2	2	3988	0	0	1	
44	0	1	0	0	69.8	180	59.64	4	0	0	0	2	37.49	10.21	13.29	3.06	3.05	2433	0	0	0	
45	1	0	0	0	78.8	179.3	62.5	4	1.76	46	0	1	15	4.29	5.72	1.26	1.26	26	0	0	0	
46	1	0	0	1	53.4	163.5	77.24	1	0	0	0	1	25.21	7.07	11.55	2.14	1.87	95	1	0	0	

Key Spreadsheet Properties

- End users control programs
- Accessible “programming”
- Easy to modify

Spreadsheet on the Web



Situational Web Application Characteristics

- Easy to create
- Solves local problem for creator
- Focus on fast deployment
- Power to the local people

Situational Web Application Components

- Feeds
- Web services
- Composition environment
- Execution environment
- Social software aspects

Examples of Situational Applications

- Excel → spreadsheets
- Access → simple databases
- Visual basic for applications → small office-based applications
- .....
- Mashups → data aggregation applications

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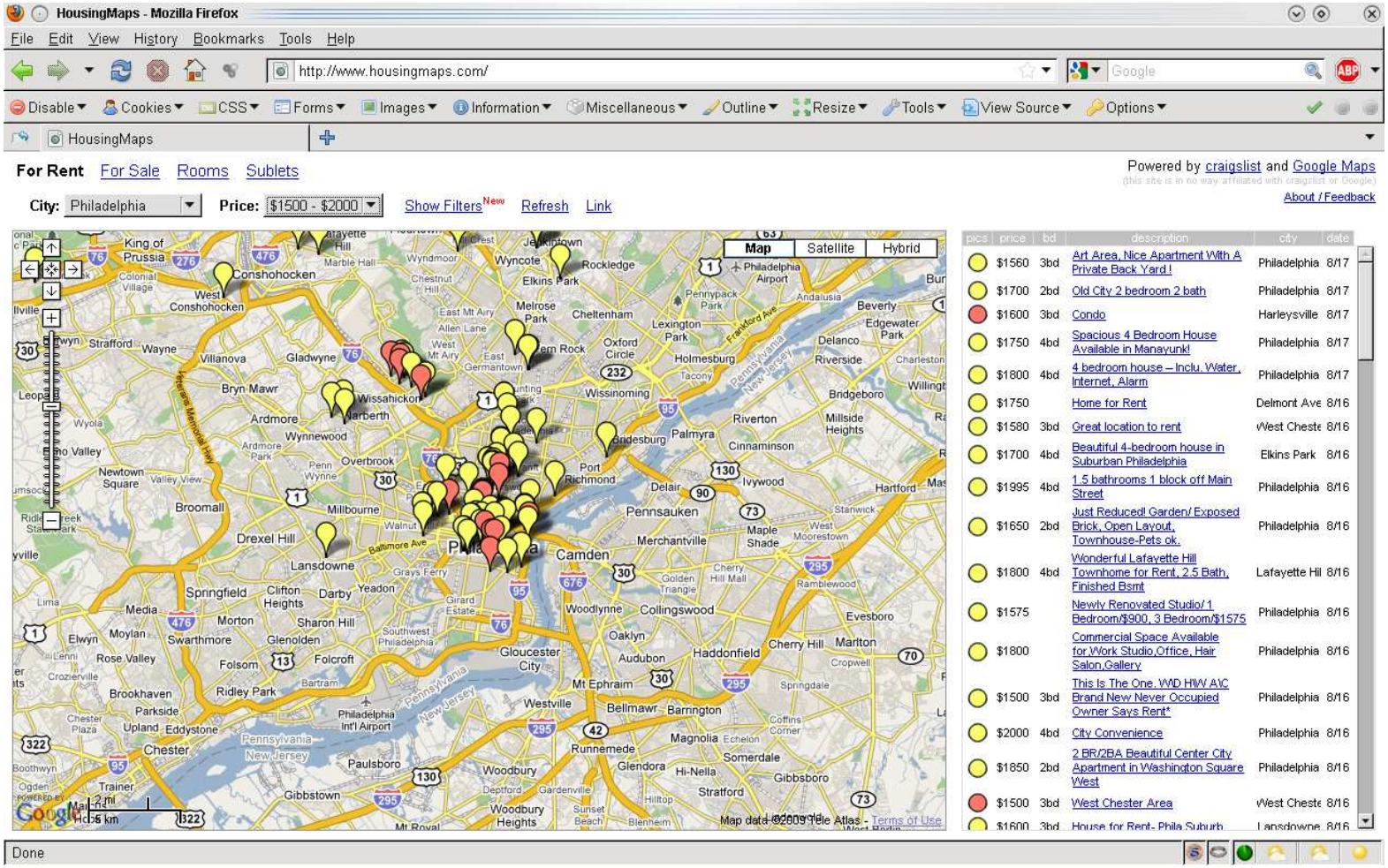
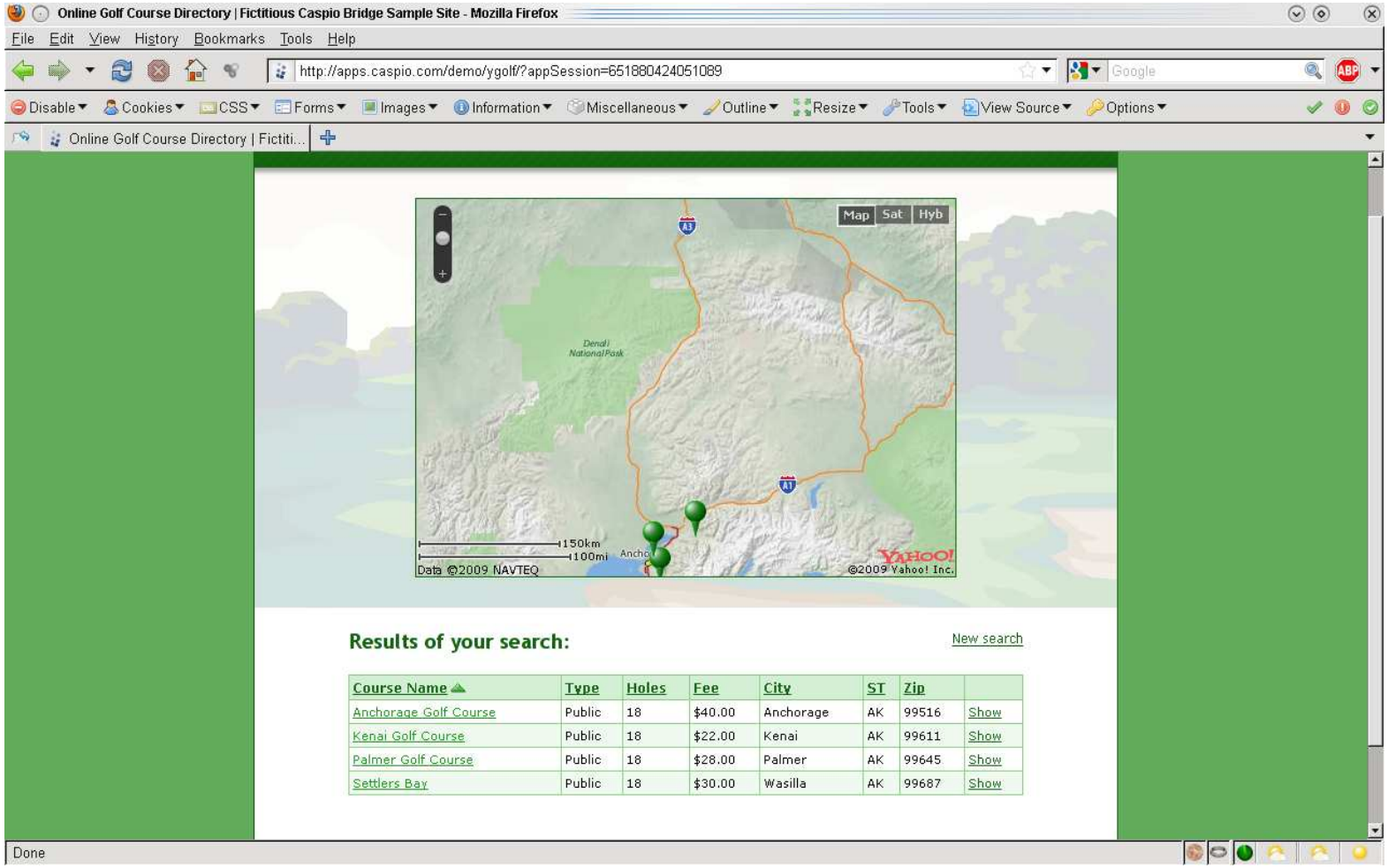
Bournemouth University

Example: Google maps

ssrc software systems research centre



Example: Caspio



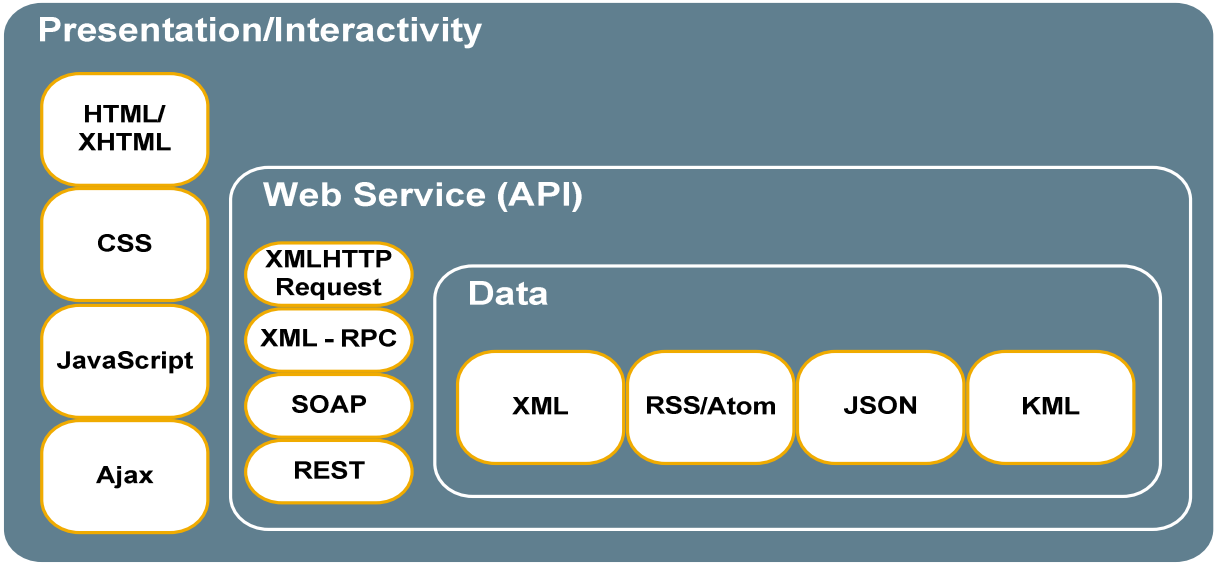
Mashup Definitions

- A “mashup” is a lightweight tactical integration of multi-sourced applications or content into a single offering (Gartner)

- Web application hybrid that combines data from more than one source into a single integrated tool (Wikipedia)

- Mashups are loosely coupled distributed systems... to the extreme. The developers of the individual components do not know each other and possibly do not even know that their application is being used as a component by another application (Wilde)

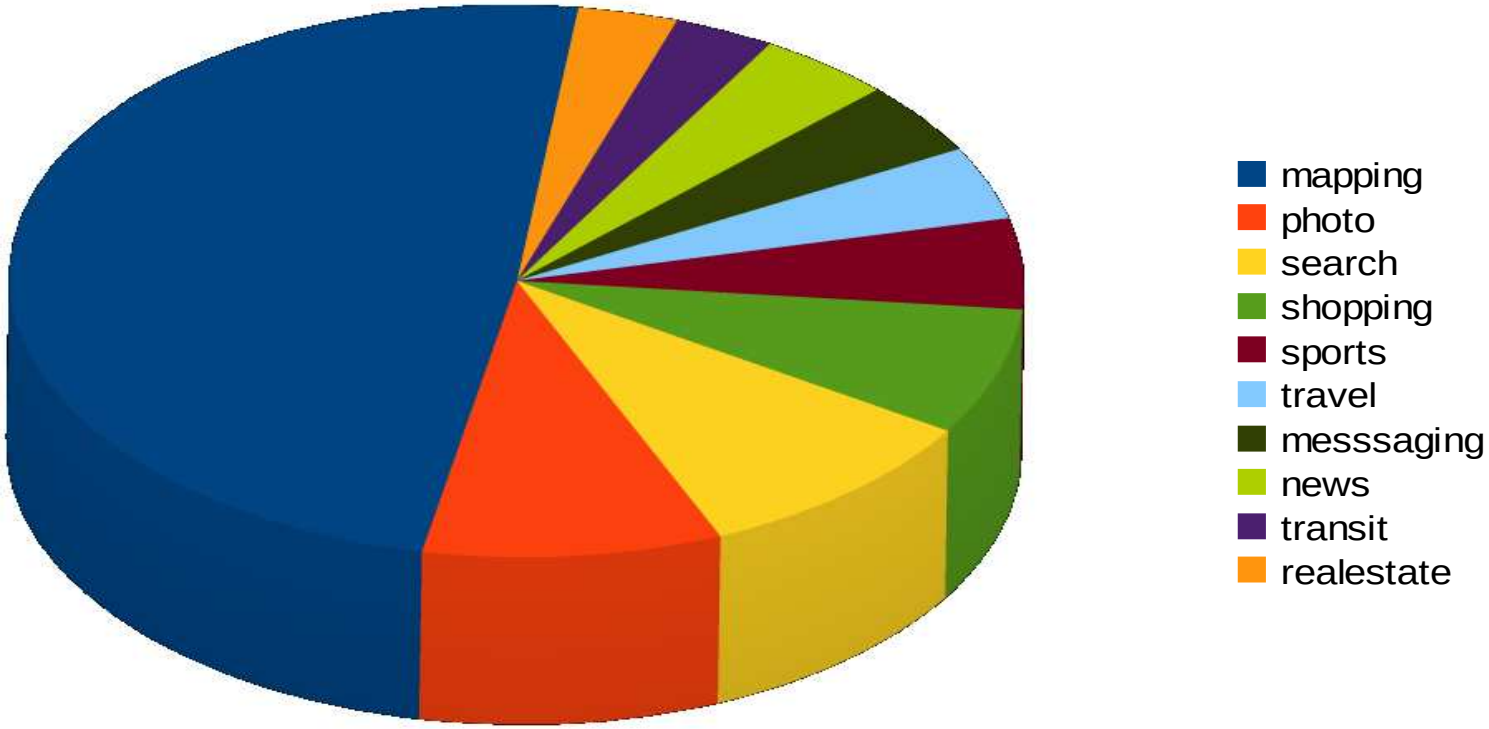
Minimal Mashup Architecture



Top 5 Mashup API's

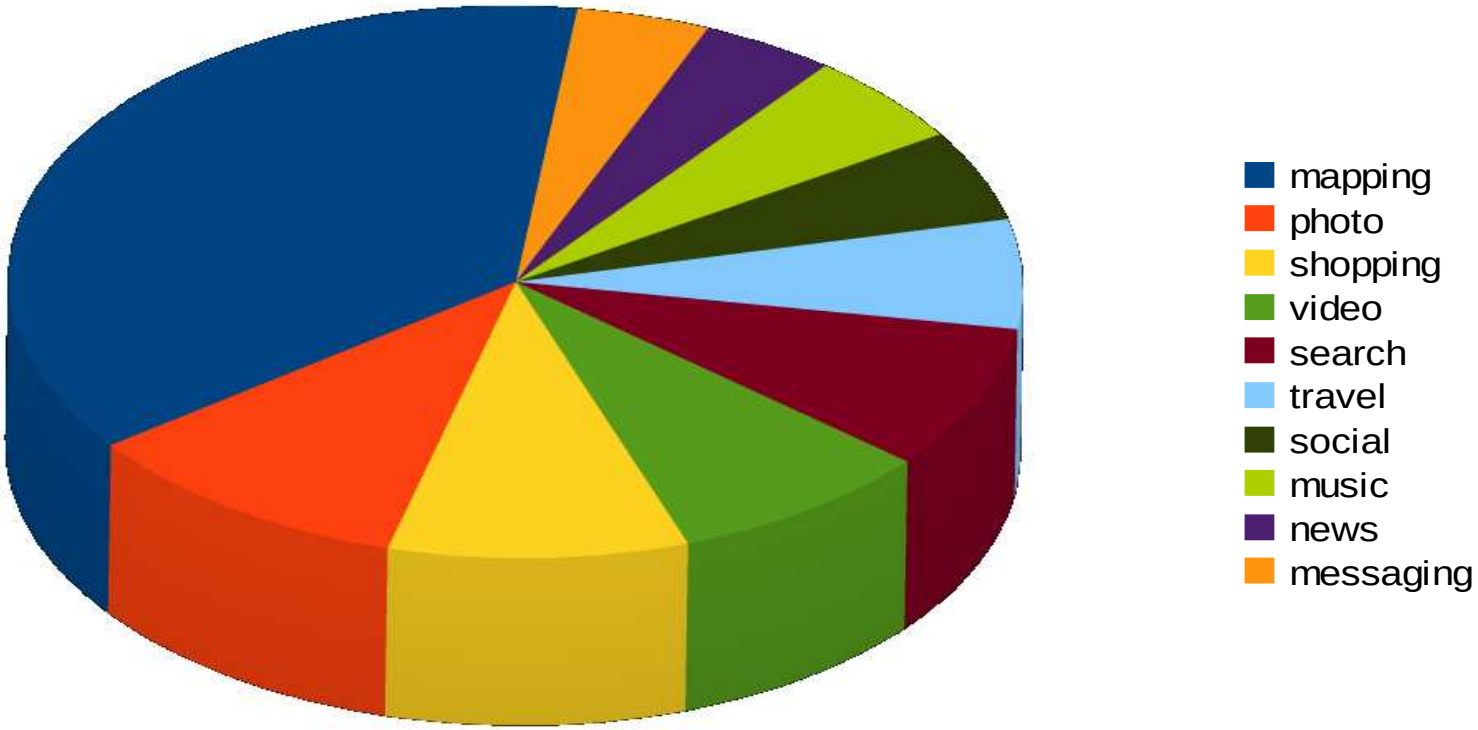
Mapping	Photo	Search	Video	e-Commerce
Google • Google Maps	Yahoo • Flickr	Google • Google Search	Google • Youtube	Ebay • Ebay API
Microsoft • Virtual Earth	Microsoft • Windows Live Spaces Photos	Microsoft • Bing	Yahoo • Yahoo video search	Amazon • e-Commerce service
Yahoo • Yahoo Maps	Google • Picasa Web Albums	Yahoo • Yahoo Search	Microsoft • Bing video search	Microsoft • Windows Live expo
				Yahoo • Yahoo Shopping

Mashup Categories (2006)



Source: programmable web http://www.programmableweb.com/

Mashup Categories (2009)



Source: programmable web http://www.programmableweb.com/

And Then

Positives

- Lots of API's
- Lots of data sources
- Many easily accessible compositions

Negatives

- Data centered
- More advanced compositions need manual coding
- Alphabet soup of standards

Situational Applications Versus Mashups

- Mashups can be situational applications
  - Main functionality is external
  - Advanced mashups require detailed and extensive programming
- Situational applications are broader
- Much business functionality has a dynamic component

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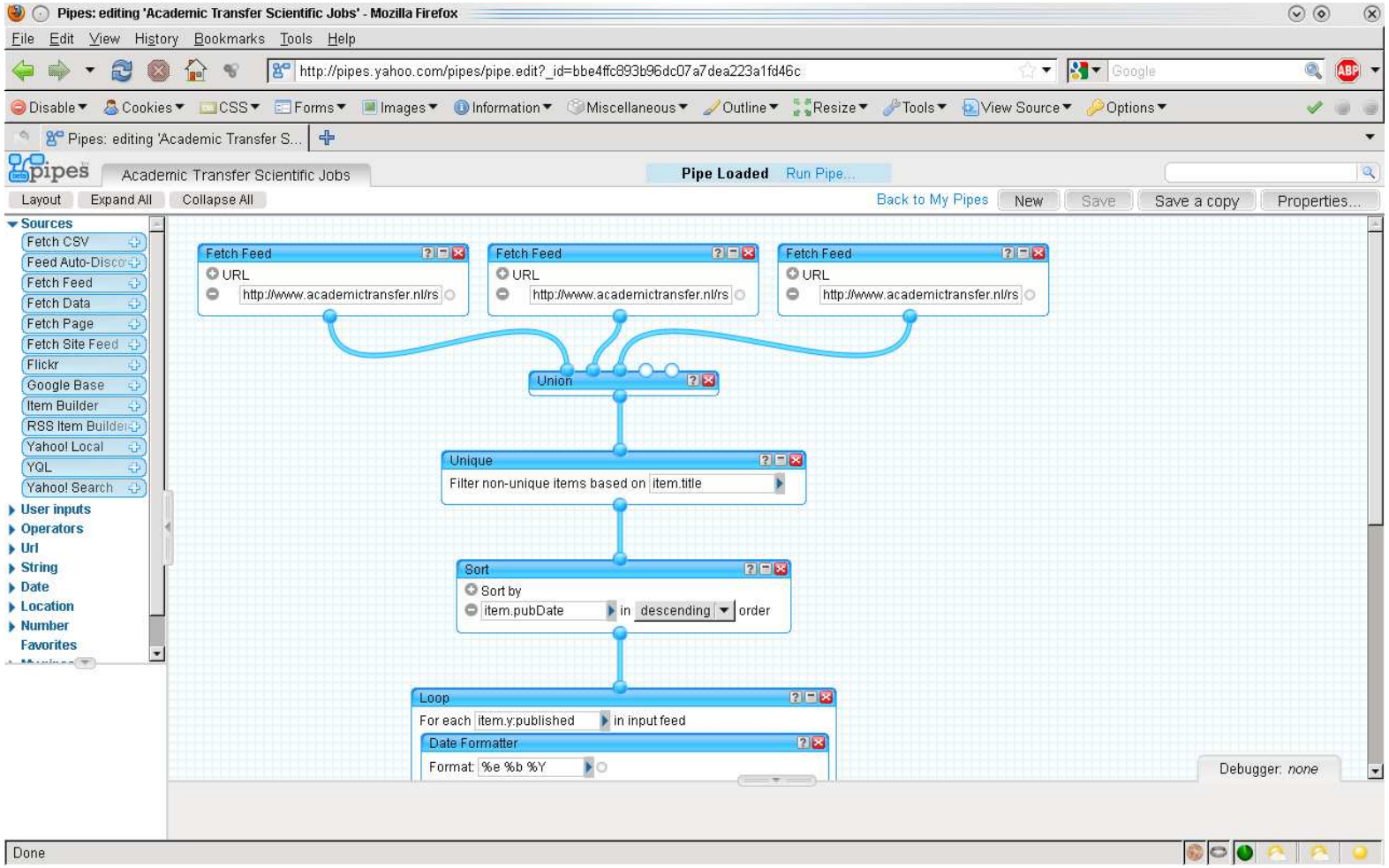
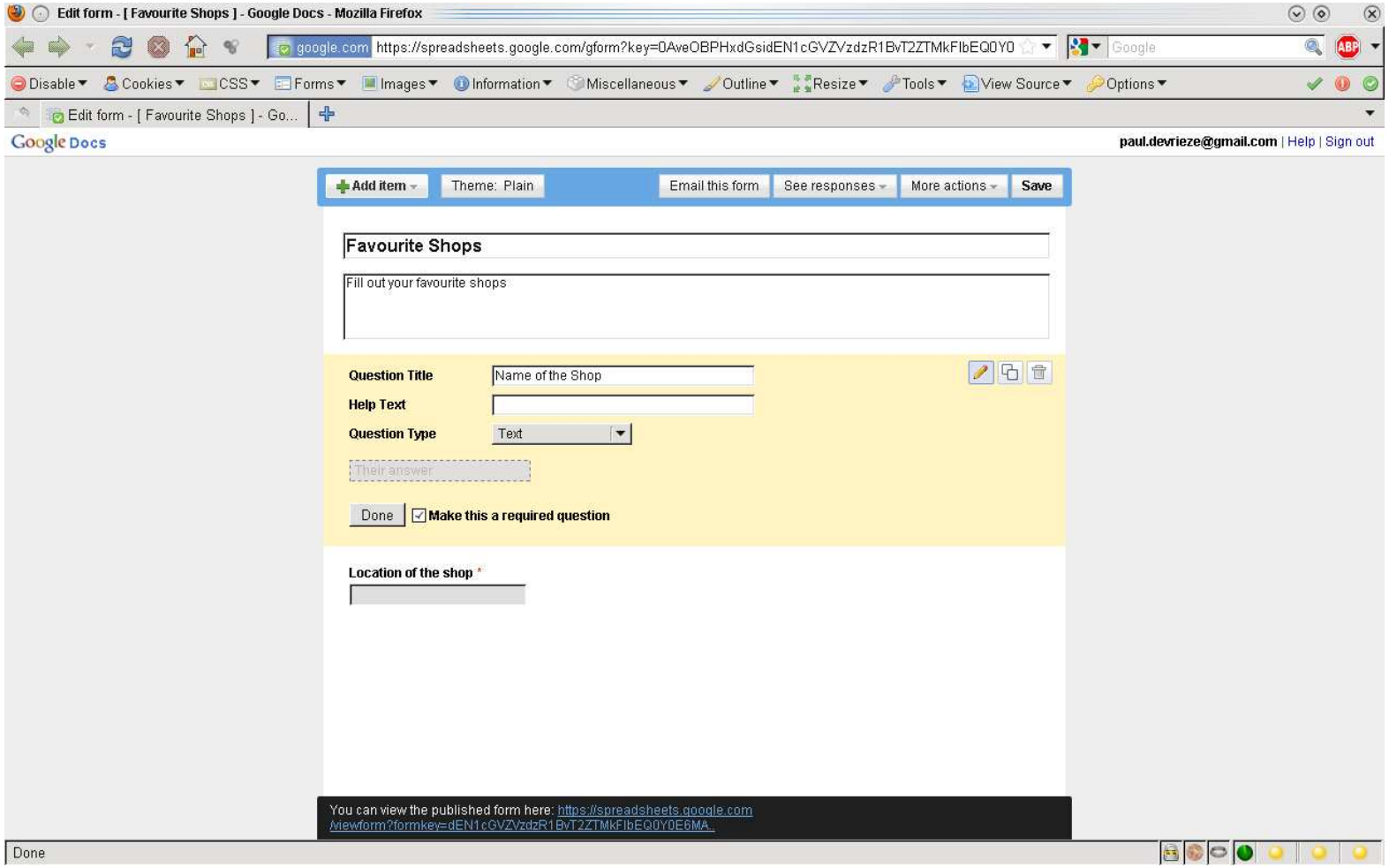
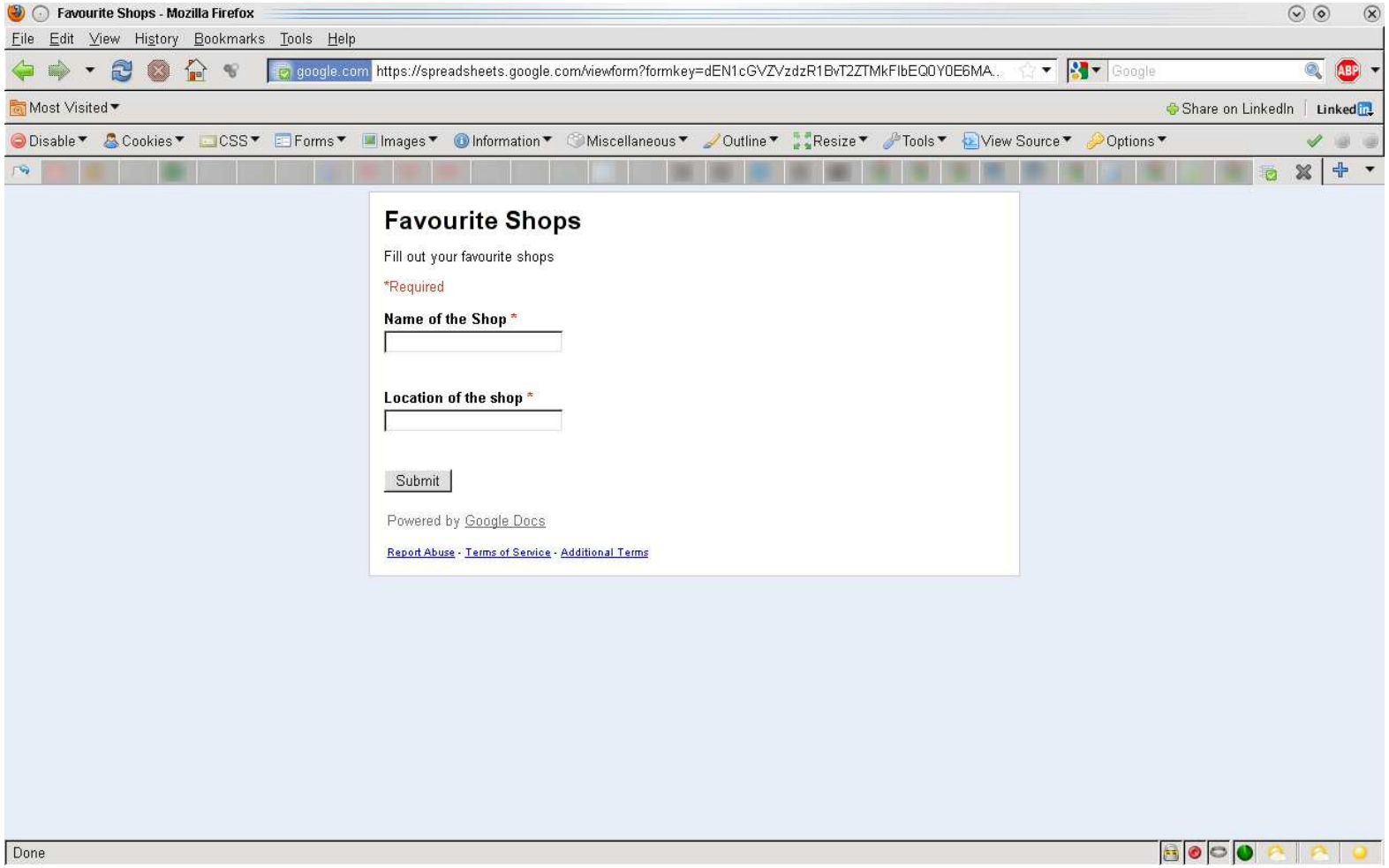
Yahoo! Pipes


Pipes: editing 'Academic Transfer Scientific Jobs' - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://pipes.yahoo.com/pipes/pipe.edit?_id=bbe4ffc893b96dc07a7dea223a1fd46c
Academic Transfer Scientific Jobs
Pipe Loaded
Run Pipe...
Layout
Expand All
Collapse All
Back to My Pipes
New
Save
Save a copy
Properties...
Sources
Fetch CSV
Fetch Feed
Fetch Data
Fetch Page
Fetch Site Feed
Flickr
Google Base
Item Builder
Yahoo! Local
YQL
Yahoo! Search
User inputs
Operators
Url
String
Date
Location
Number
Favorites
Fetch Feed
URL
http://www.academictransfer.nl/rs
Union
Unique
Filter non-unique items based on item.title
Sort
Sort by
item.pubDate
in
descending
order
Loop
For each item.y:published
in input feed
Date Formatter
Format: %e %b %Y
Debugger: none
Done

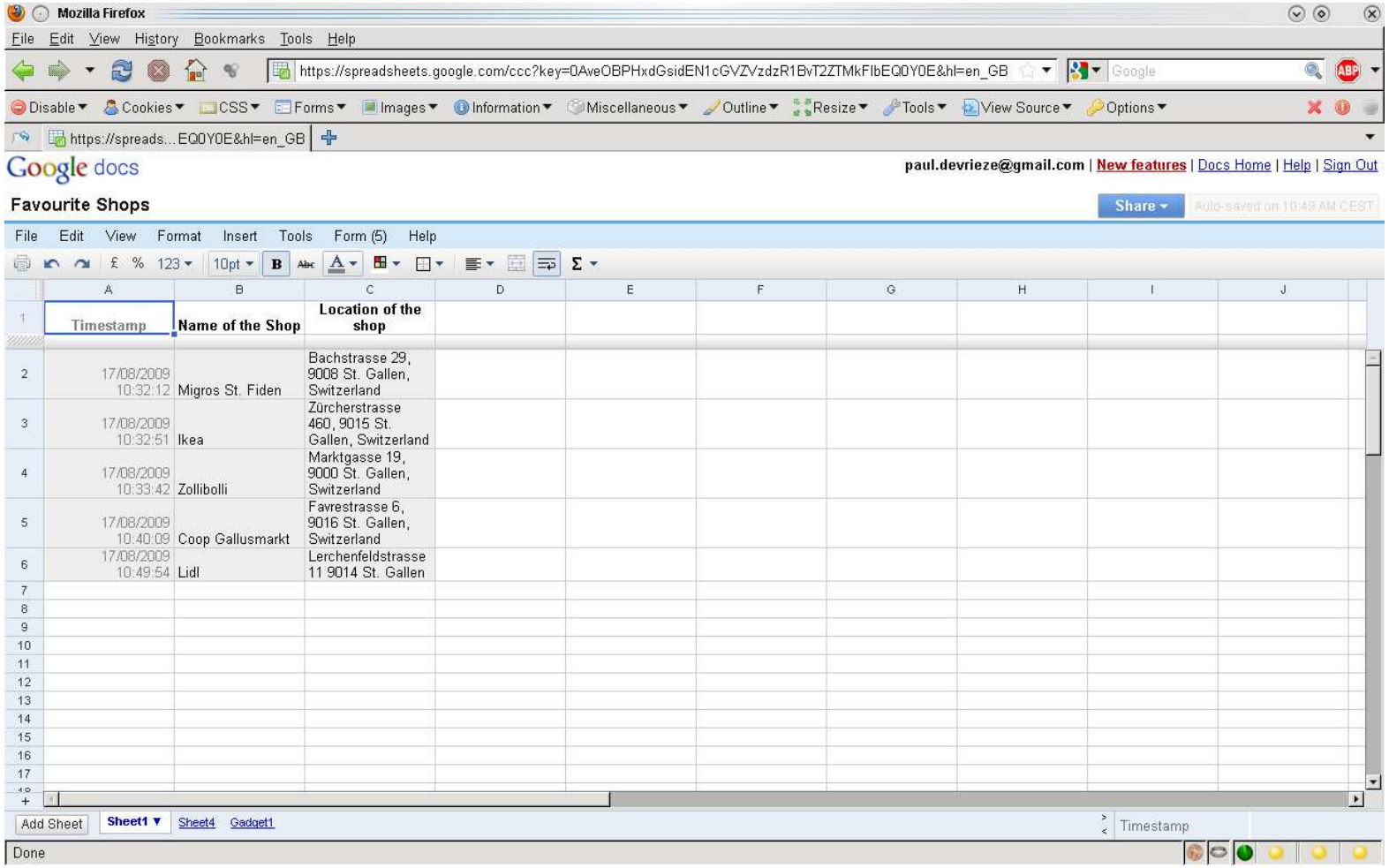
Google docs: Create a Form



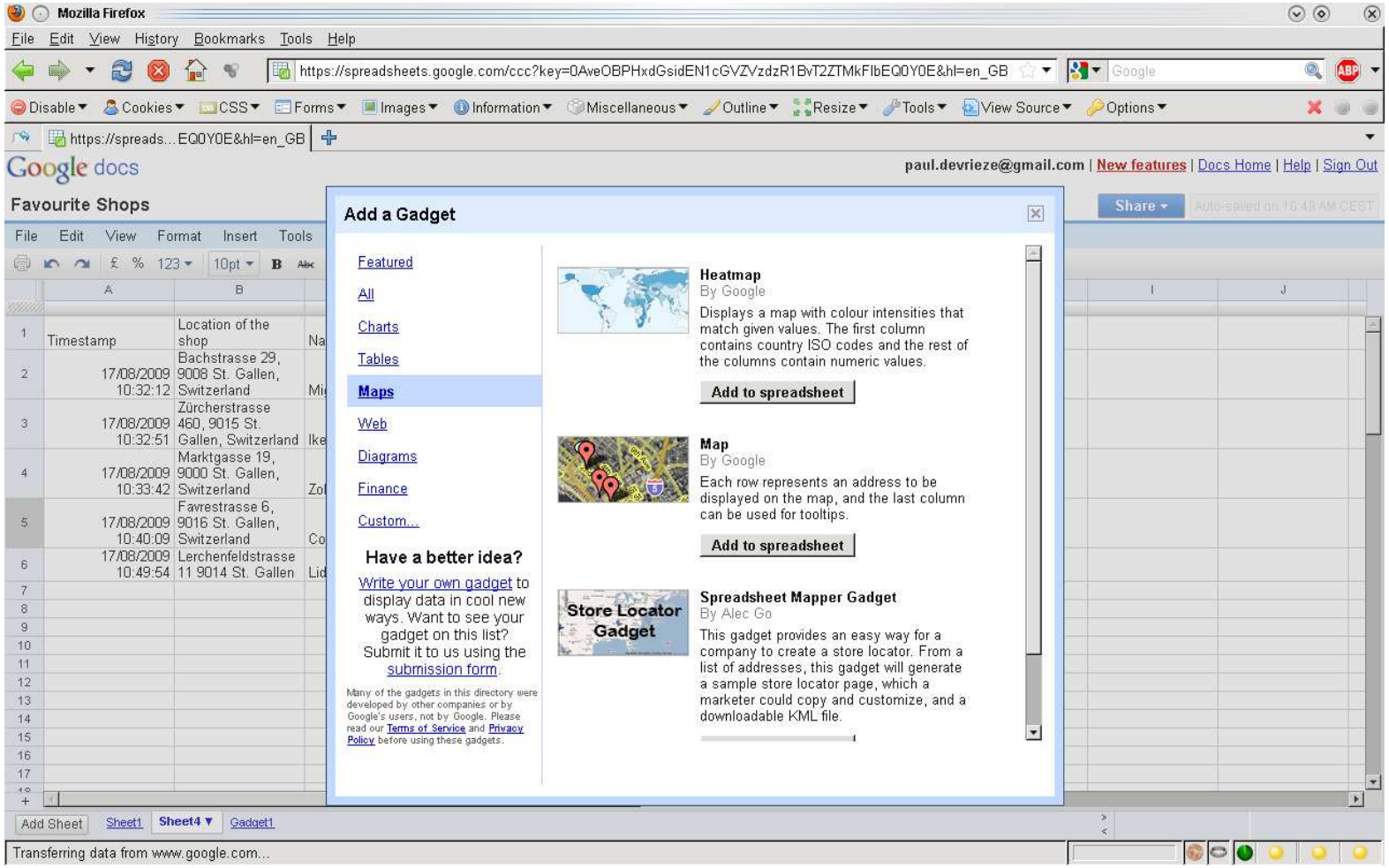
Google docs: The Resulting Form



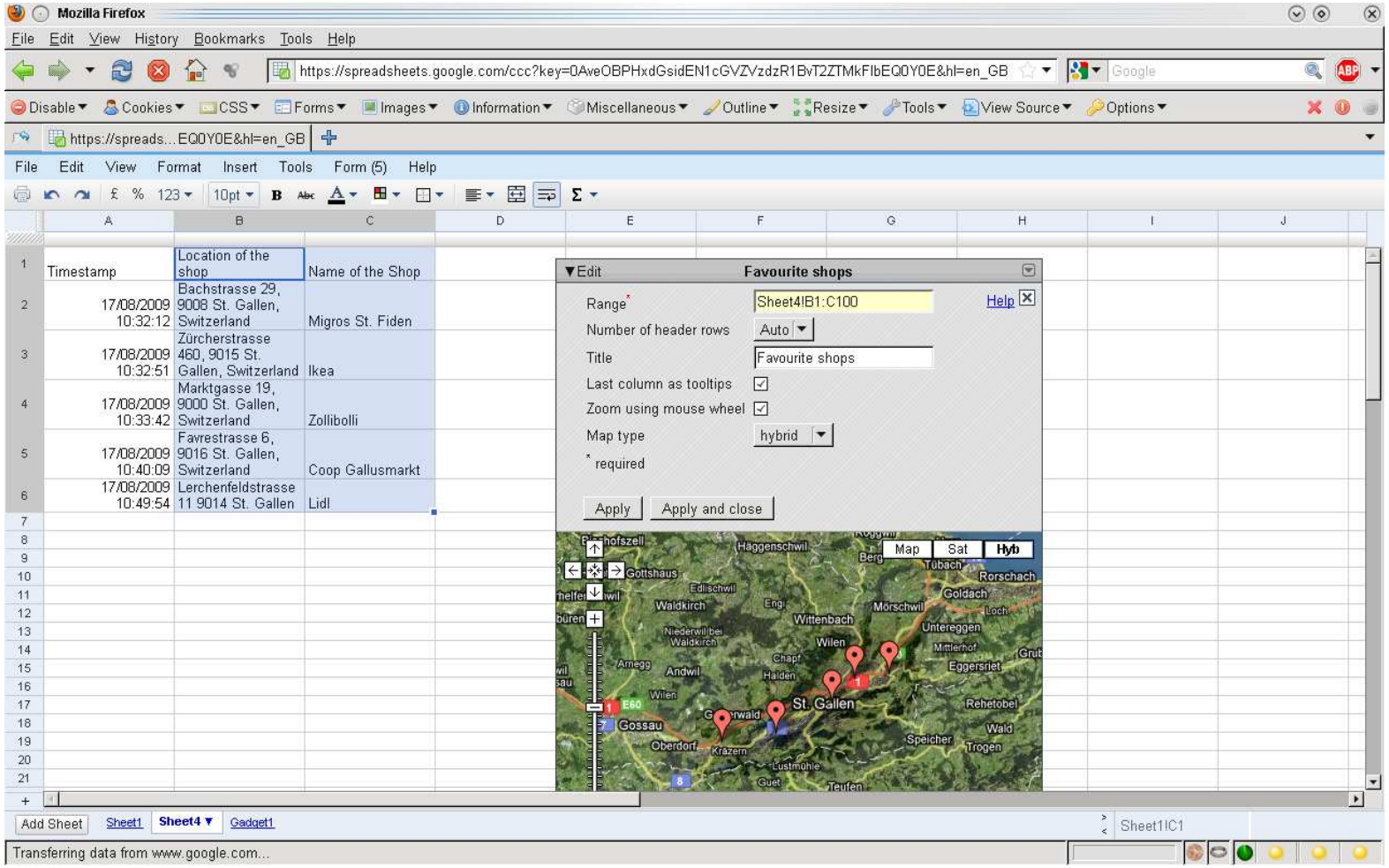
Google docs: The Data in the Spreadsheet



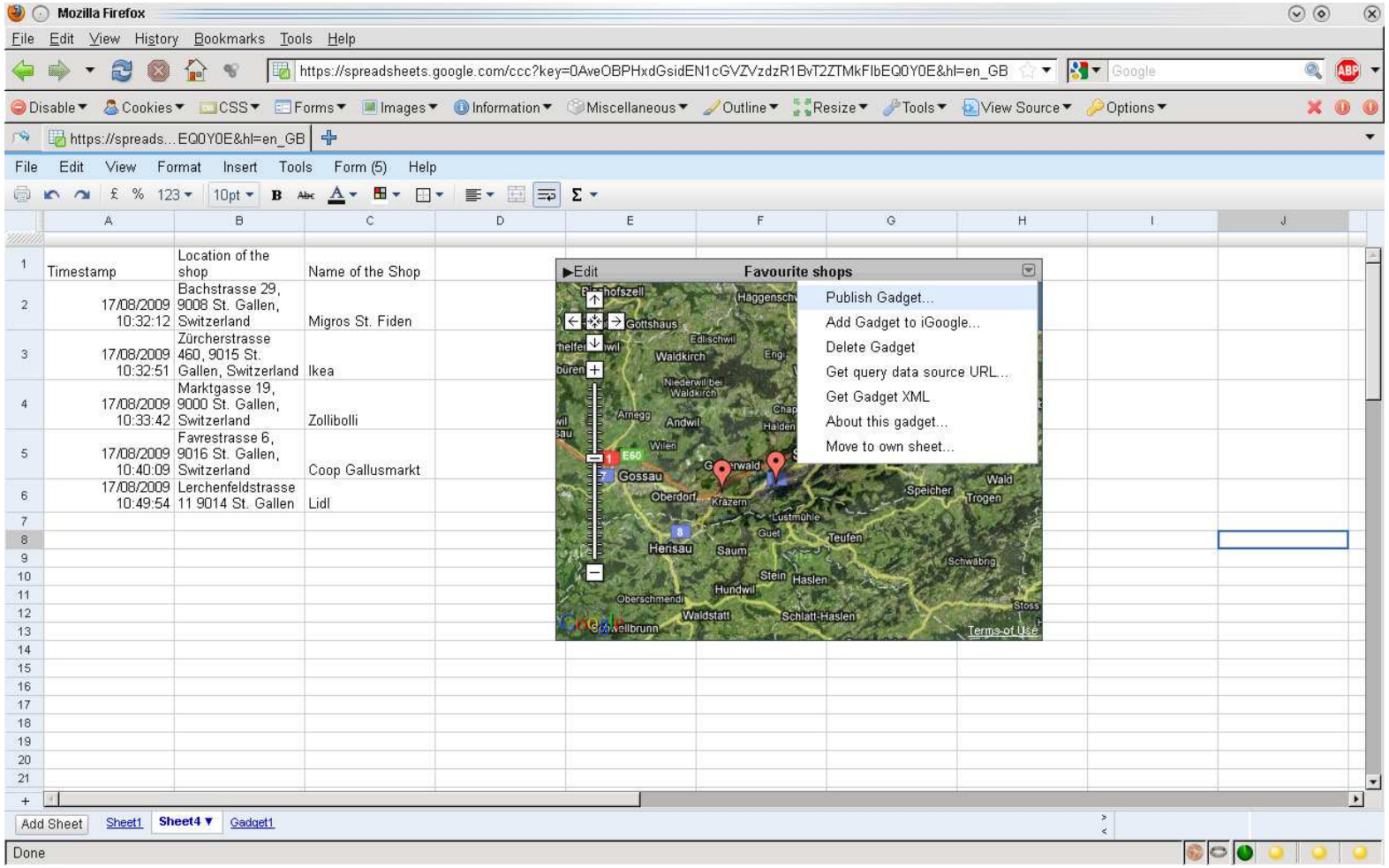
Google docs: Let's Add A Gadget



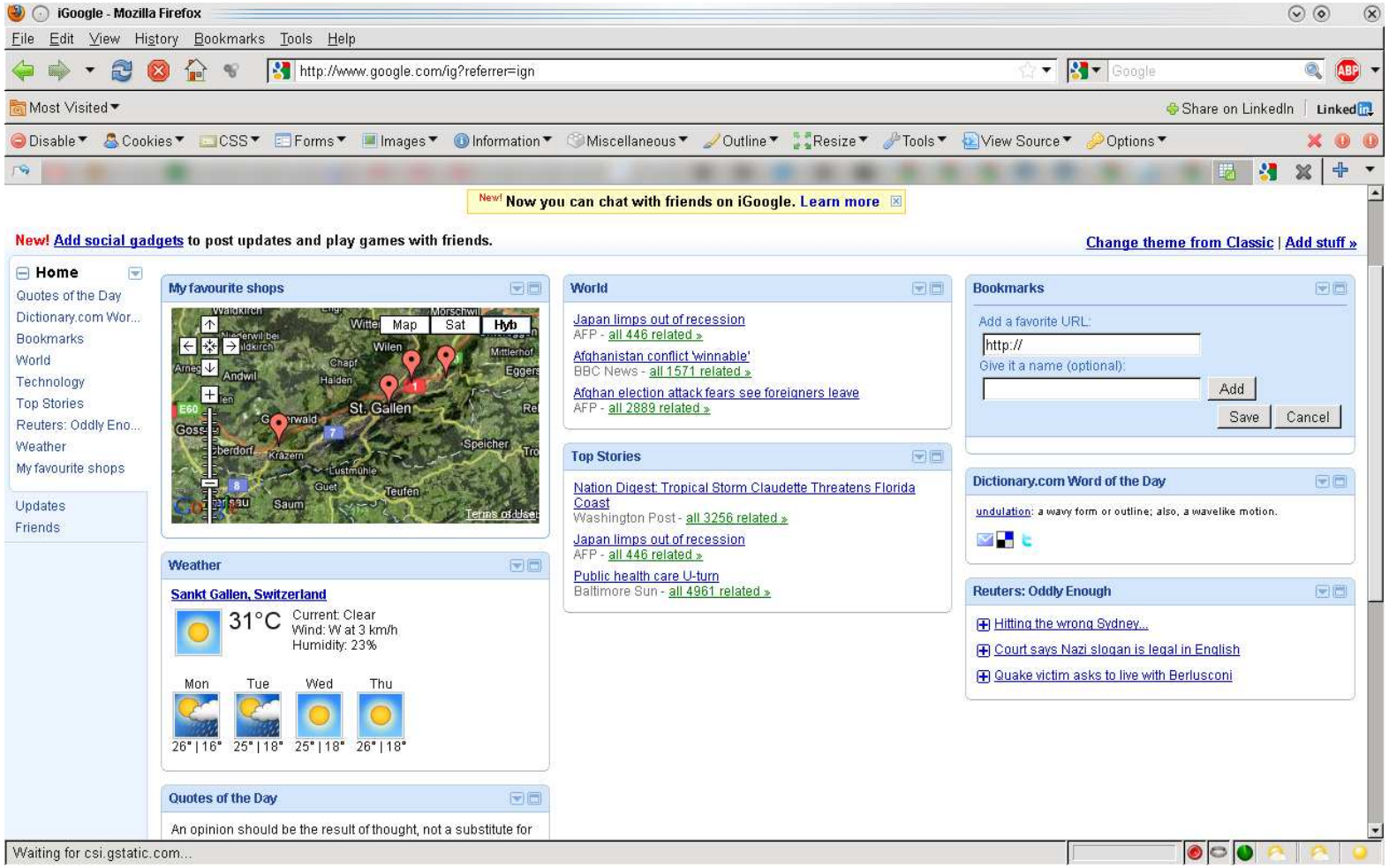
Google docs: Configure the Gadget



Google docs: Our Gadget Ready to Export



Google docs: Add the result to iGoogle



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Situational Application New Relevance

- More XML content
- More services
- More feeds
- Cloud provides computing in the network (The Network is the computer - SUN)
- Cheap, network accessible computing gives ability to users:
  - salesforce.com

Types of Situational Enterprise Applications

- Data-oriented applications

  widgets, gadgets, pipes and mashups

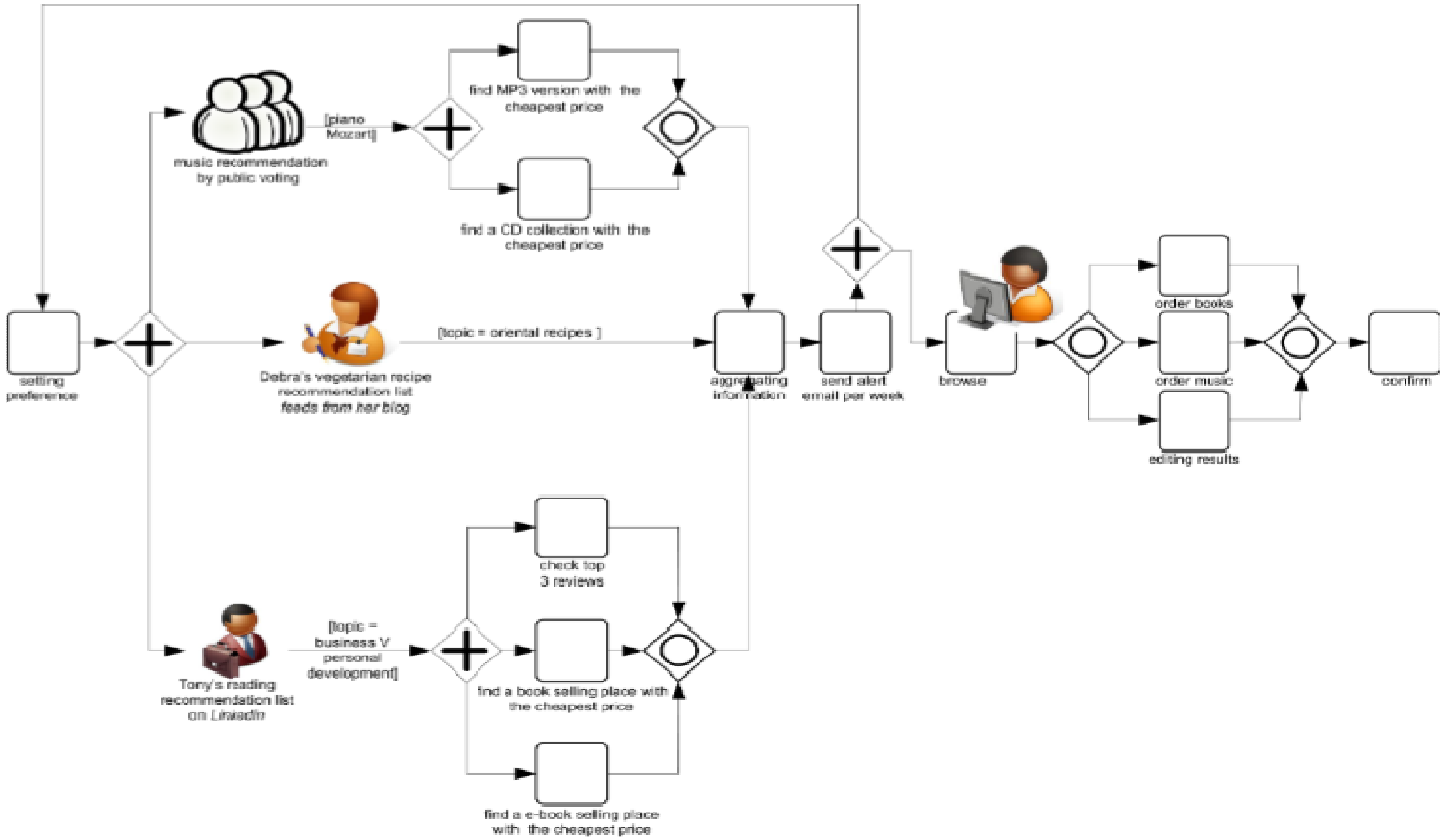
- Process-oriented applications

  SOA4All

Extending the Range of Mashups

- Support processes, not only data
- Allow non-programmer composition of advanced apps with interesting components
- Perform technical compatibility adjustments automatically

Motivated Examples



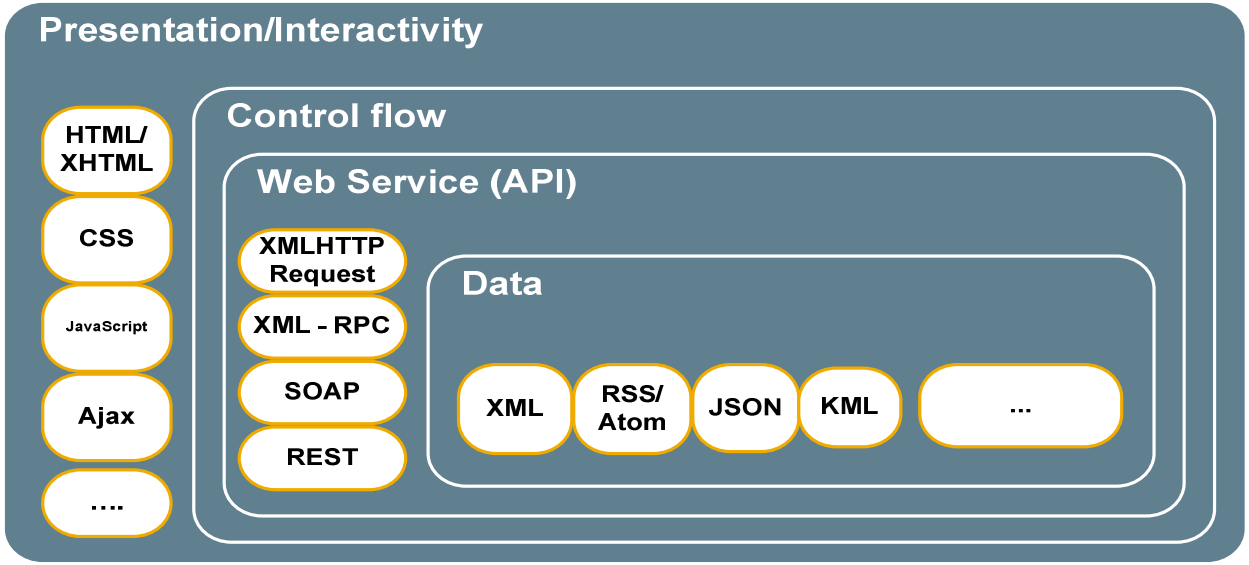
Business Process Mashup

- Positioned next to enterprise workflow engine
- Allow for support of “unsupportable processes” that are:
  - Dynamic in nature
  - Not common enough
  - Hard to explain to non-domain experts
  - Too small for centralised implementation, benefits too small

BPM Mashup Requirements

- Central platform responsible for execution
- Easy composition language
- Easy access to services
  - Semantic matching / retrieval
  - Automatic wrappers

Minimal Business Process Mashup Architecture



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SOA4All Executive Summary

Goal

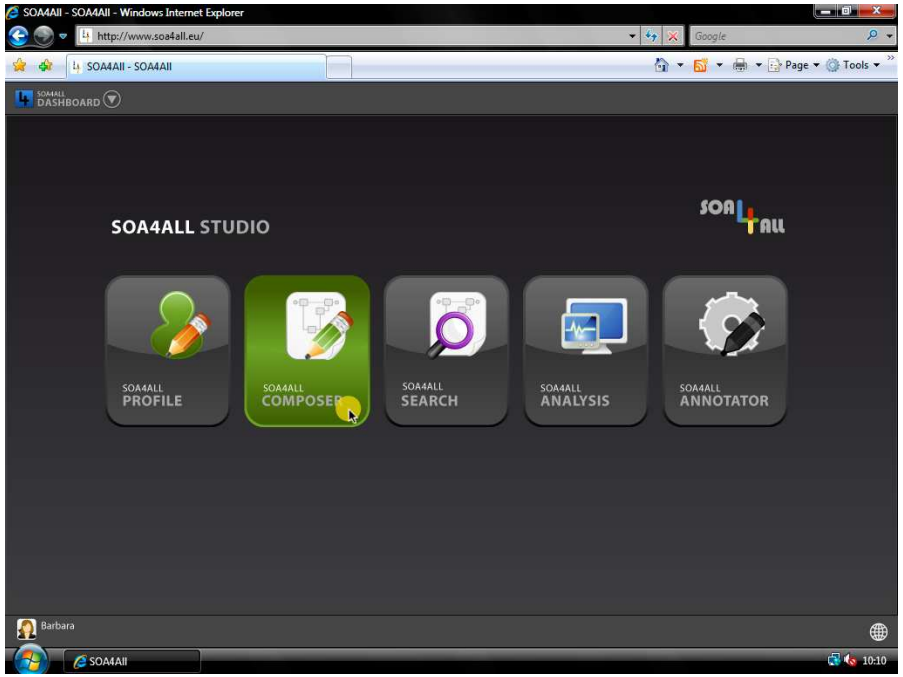
- building a distributed infrastructure that brings WS and SOA to a Web scale
- providing a platform where everyone can participate.

Partners

EU Funded Project (FP7)

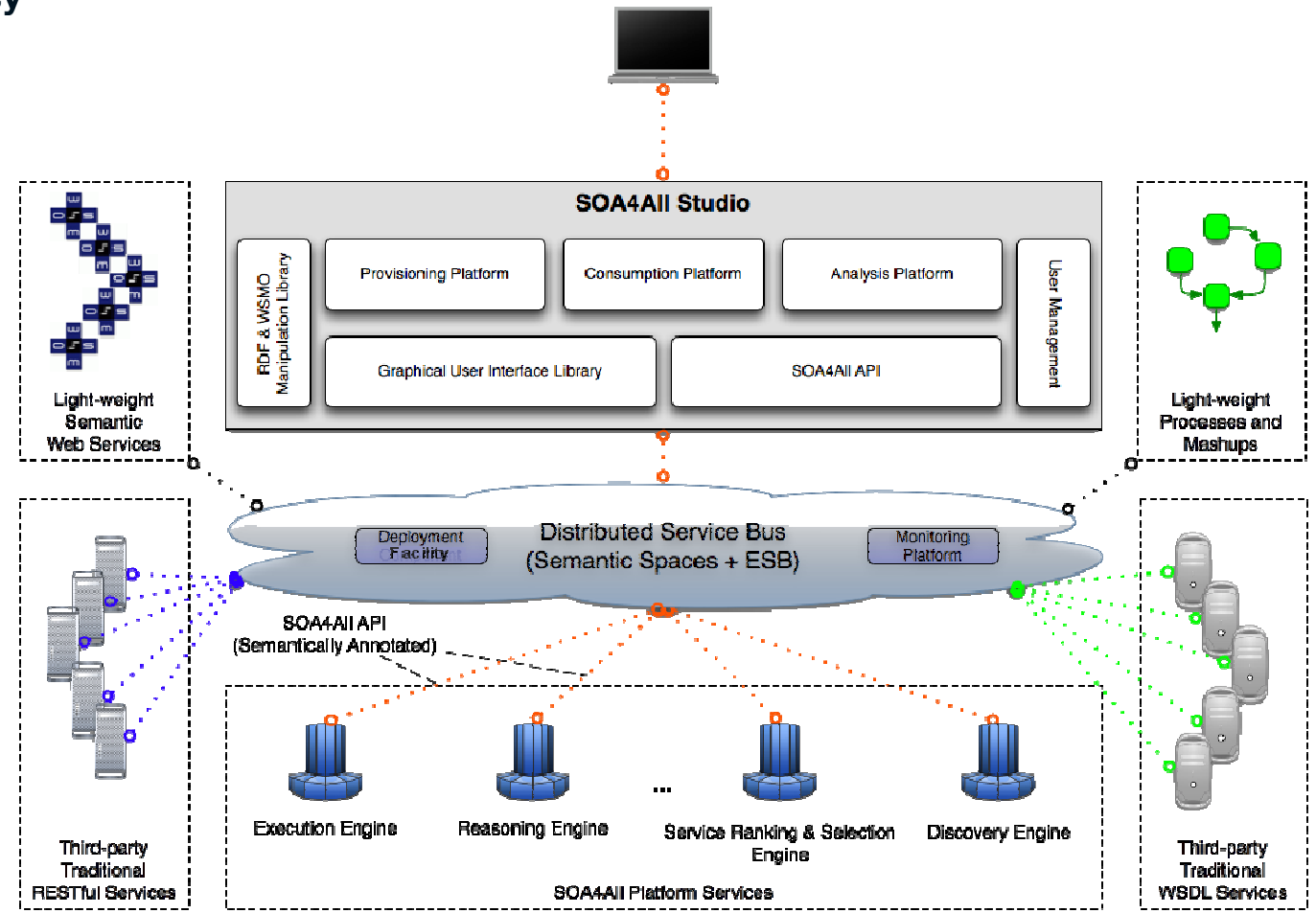
- March 2008 – February 2011
- Project Budget: 13,7 m €
- 16 Partners from academia and industry

Main Features of SOA4All From the User's Perspective



- ***empowerment*** of business users
  - web-based tools
  - guidance by wizards
- ***wisdom of the*** business ***crowds***
  - share processes and knowledge (comments, tags, ratings) through a community
- ***lightweight*** business processes
  - SAP ES, public web services, and human tasks
  - modeling and execution
- ***semantics*** as base technology
  - smart discovery and composition of services

SOA4All Overall Architecture



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Mashups

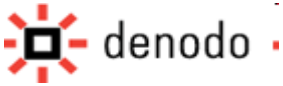

iGoogle


IBM Mashup Center


SERENA
SERENA BUSINESS MASHUPS


netvibes


nexaweb
Enterprise Web 2.0


denodo


YAHOO!
pipes


Microsoft
Popfly


kapow
TECHNOLOGIES


dapper

Resources for Creating Mashups

- Seekda (webservices.seekda.com)
  Web service search engine
- Programmable Web (www.programmableweb.com) mashup directories
- Social bookmarking web site for searching feeds (www.syndic8.com)

Final Summary

- Outlined a variety of process oriented approaches to development, which all aim (by different means) to improve stakeholder involvement and increase alignment of IT with business needs.
  - Simple role based process models to inform requirements.
  - Methods for moving from role models to use cases, to identify system boundary, maintain mapping and enhance alignment.
  - Improvement in specification to utilise richness of process and enhance use case comprehension and power.
  - Model driven approaches (transform process model to software models)
  - Application toolset (VIDE) to provide accessible CIM models (process models) as a first step in model driven development.
  - Introduced mashups for situational enterprises.
  - Process oriented mashups to provide accessible and efficient development and resources for mashup development.