

F4K WP3 Summary

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WP3 Content

- Workflow System
- Domain Models
 - Domain ontologies – D3.1
 - Related ontologies – D3.2
 - Process library – D3.1
- Workflow System Design
 - Process Composition
 - Process Execution



Introduction to WP3

- To create a working workflow system for viewing and analysing fish videos
- The workflow system
 - uses video data captured by F4K project partner NCHC
 - and analysis and process them making use of VIP modules generated by F4K IP team; and
 - Support feedback to answer targeted user queries.

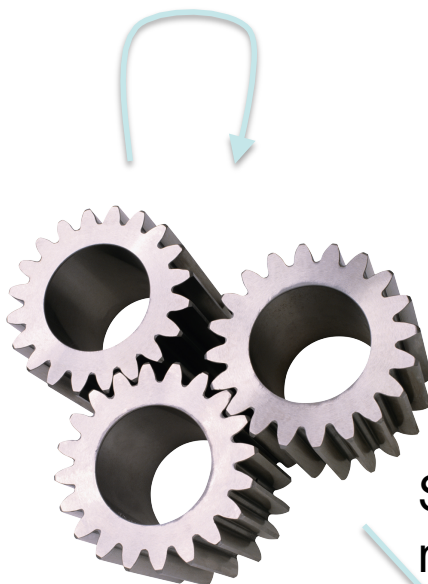


A high level view of the use Of the workflow system 1



Initial Batch
run request

Preliminary Analysis



Workflow
System

Select and run
modules

results

videos

annotations



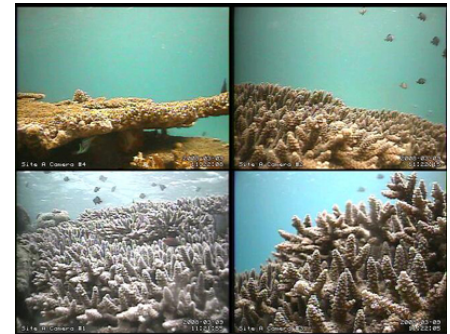
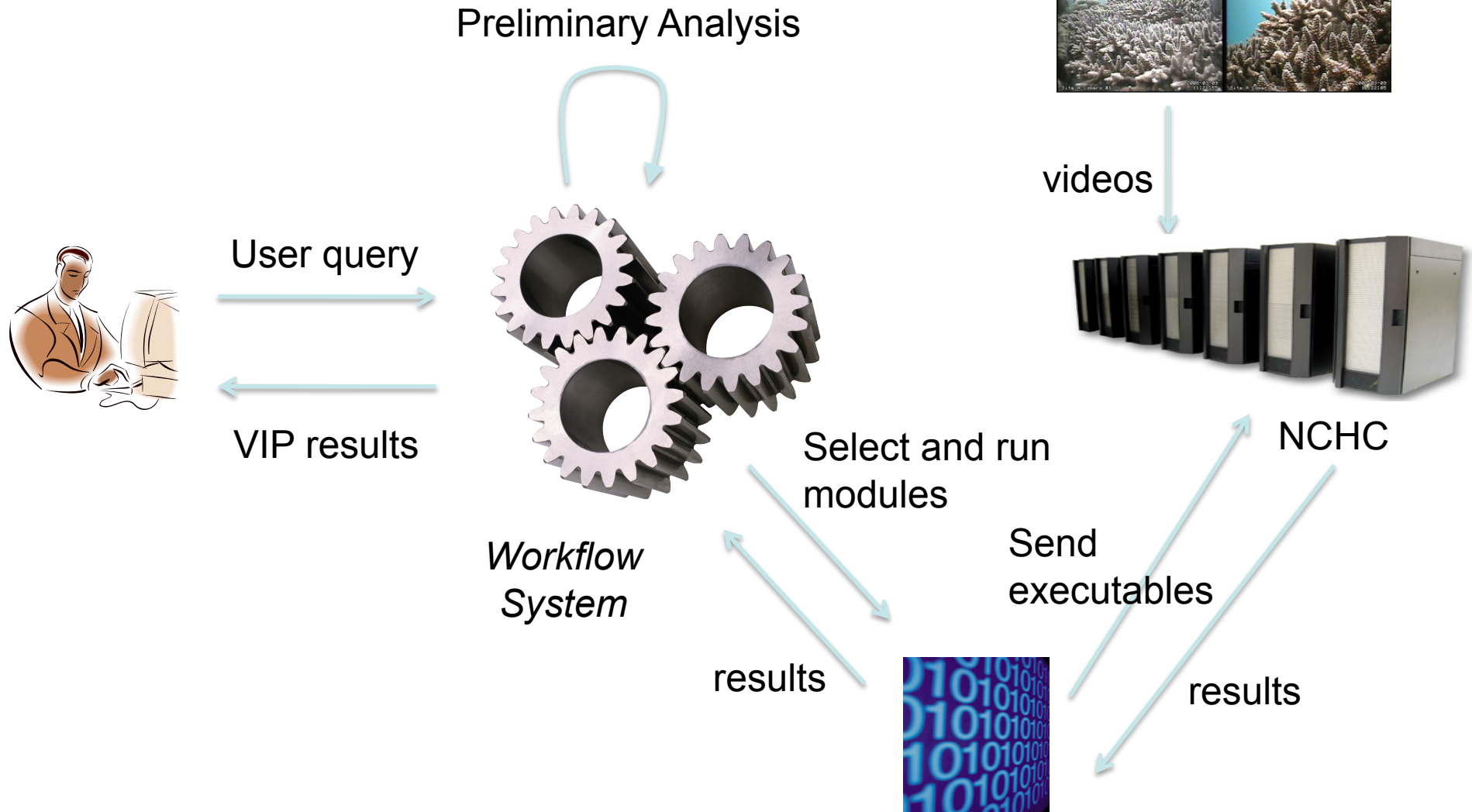
NCHC

Send
executables

results



A high level view of the use Of the workflow system 1



System Approach

- Knowledge based
 - Separation of problem and domain description; applied software modules; and the workflow engine itself
- Workflow system interpreter
- Logic based reasoning
- Planning technology

Knowledge Required

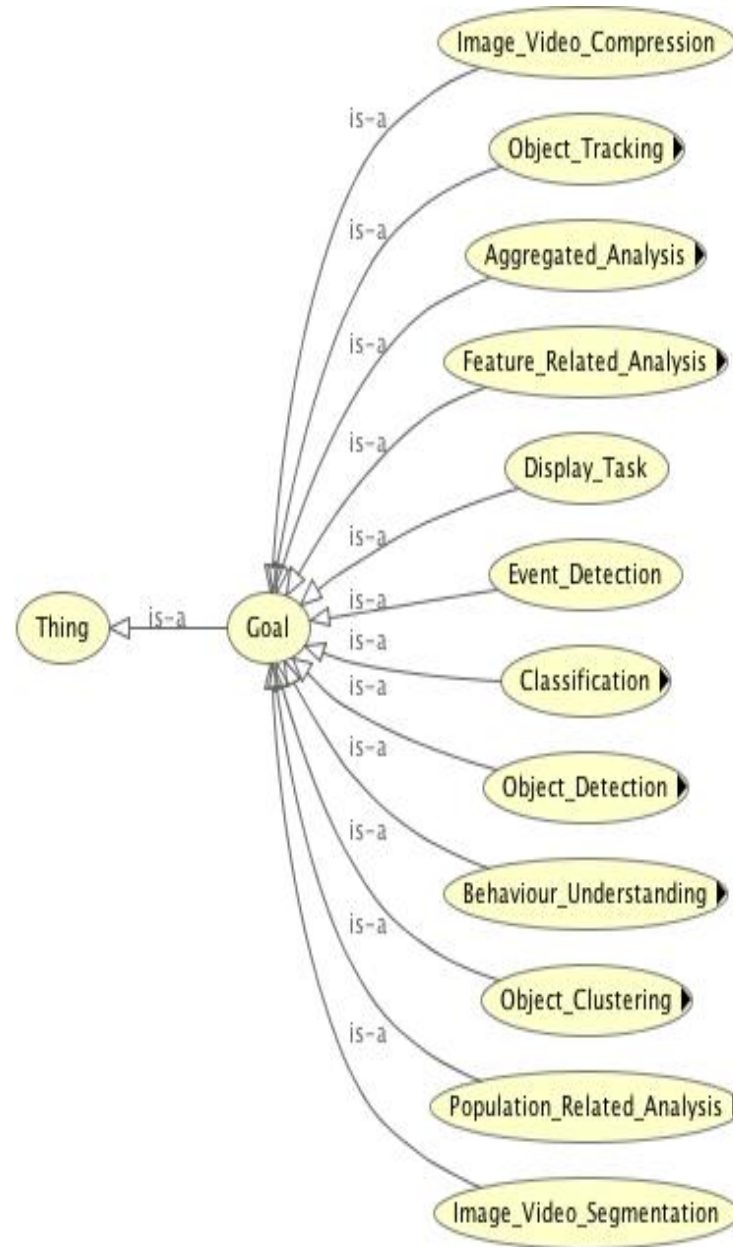
- Problem description
- Domain description
- Task description
- Software modules description
- Linking mechanism for the above descriptions and capabilities



Domain Models

- Goal Ontology that is task-related D3.1
- Video Description Ontology D3.1
- Capability Ontology D3.1
- Process models and library D3.1
- Extension to the FAO ontology D3.4











Extensions to the FAO Ontologies



Table 6: 27 most common fishes identified for F4K project, their corresponding Taxonomic codes, instance names (IDs) in FAO's Species_taxonomic class and FishBase IDs. FAO instance IDs ending with (f) denote a mapping at Family level for the fishes that cannot be found at species level.

No.	Scientific Name	Common Name(s)	FAO Taxonomic Code	FAO Instance (ID)	FishBase Instance ID
1	<i>Acanthurus nigrofuscus</i>	Brown surgeonfish	1740200414	ID_31005_10150	4739
2	<i>Acanthurus</i> sp.	Surgeonfishes Tangs Unicornfishes	17402XXXXX	ID_31005_3264	412
3	<i>Amphiprion clarkii</i>	Yellowtail clownfish Clark's anemonefish	17062XXXXX	ID_31003_7438 (f)	5448
4	<i>Anampses meleagrides</i>	Yellowtail Wrasse Spotted wrasse	17063XXXXX	ID_31005_3224 (f)	4889
5	<i>Balistapus undulatus</i>	Orange-lined triggerfish	1901000101	ID_31005_10702	6025
6	<i>Cantherhines dumerilii</i>	Whitespotted filefish	19009004XX	ID_31005_2566 (f)	5836
7	<i>Canthigaster valentini</i>	Valentini Pufferfish Valentin's sharpnose puffer	19002XXXXX	ID_31005_3374 (f)	6544
8	<i>Chaetodon speculum</i>	Mirror butterflyfish	17052XXXXX	ID_31005_3214 (f)	5576
9	<i>Chaetodon trifascialis</i>	Chevron butterflyfish	17052XXXXX	ID_31005_3214 (f)	5578
10	Chaetodontidae	Butterflyfishes	17052XXXXX	ID_31005_3214	343
11	<i>Chromis margaritifer</i>	Bicolor chromis	17062XXXXX	ID_31003_7438 (f)	5675
12	<i>Chlorurus bowersi</i>	Bower's parrotfish	17065XXXXX	ID_31005_2425 (f)	5542

4.1 New instances of Object Properties

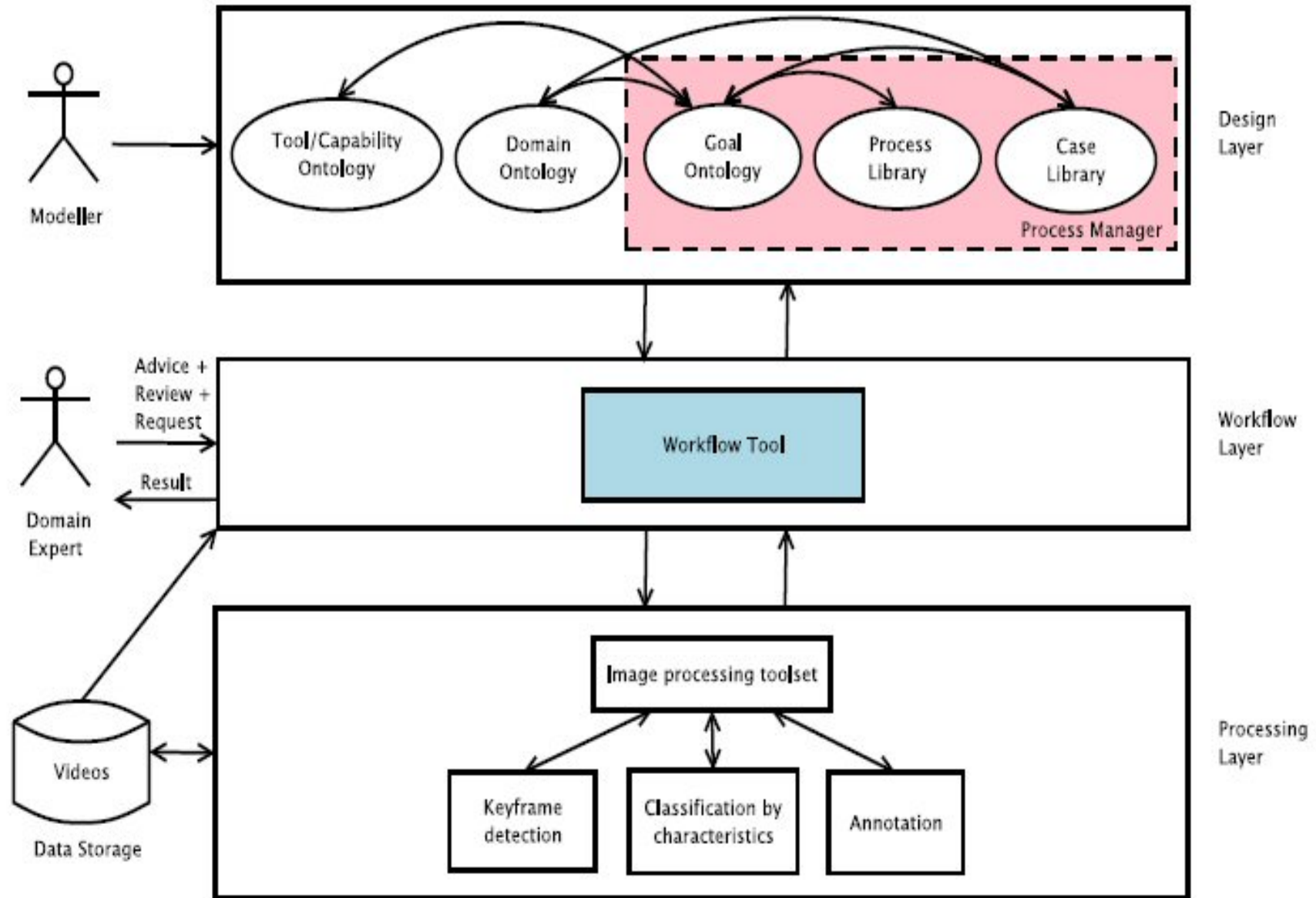
Here we added 6 new object properties, as described below:

Table 5: New instances of object properties in the class Land_Areas.

Domain	Object property	Range	Comments	Provenance	Status
eastern_Asia	hasMember	Taiwan		http://aims.fao.org/aos/geopolitical.owl#hasMember	new instance.
Taiwan	isInGroup	eastern_Asia		http://aims.fao.org/aos/geopolitical.owl#isInGroup	new instance
EAC	hasMember	Taiwan		http://aims.fao.org/aos/geopolitical.owl#hasMember	new instance
Taiwan	isInGroup	EAC		http://aims.fao.org/aos/geopolitical.owl#isInGroup	new instance
World	hasMember	Taiwan		http://aims.fao.org/aos/geopolitical.owl#hasMember	new instance
Taiwan	isInGroup	World		http://aims.fao.org/aos/geopolitical.owl#isInGroup	new instance

Workflow System Design





Progress SoFar

- Built a first version of workflow system based on a set of VIP modules to carry out preliminary video and image analysis
- Built a first version of working UI that allows the user to interact with the workflow system directly

Select video

28.mpeg

- Classify video according to brightness, clearness and algal levels
- Detect and count fish in each frame of video
- Classify video, detect and count fish in each frame

Results displayed. Ready. Select a video and goal to proceed.



Video Descriptions (Optional)

Brightness

- dark
- medium
- bright

Clearness

- blur
- medium
- clear

Algal level

- green
- not green

Constraints (Optional)

Performance

- fast
- less memory

Quality

- reliable
- robust

Unknown objects

- ignore
- score

Reset

GO

Next Step

- Linking/reconfiguring the first version of the workflow system with NCHC's High Performance Computing facilities
- Investigate parallelism and efficient workflow algorithms for process execution and scheduling

Conclusion

- State-of-the-art domain models done
- State-of-the-art process models done
- State-of-the-art VIP modules tested
- Design and an initial version of the workflow system done
- To investigate and implement workflow distribution and parallelism on HPC machines

Thank you for listening !!



F4K Project Dissemination

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Progress Sofar

- F4K project web site
 - state-of-the-art, update as project progresses.
- Workshop promised for the 1st year
 - One invited session on “Intelligent Workflow, Cloud Computing and Systems” as a part of the KES AMSTA conference, June 29 - July 1 2011.
(finished)



Public Accessible Resources

– User Interfaces

- Workflow System UI first version ready
- Data Access, Analysis and Annotation
 - Crowd sourcing UI first version ready

– F4K SL Gallery and Aquarium

- state-of-the-art, to update posters as project evolves



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Crowd Sourcing UI 1

The screenshot shows a web browser window at f4k.ing.unict.it/perla/. The page features a navigation menu with the following items: Welcome, Workspace, **Detection - Tracking Ground Truth**, Classification Ground Truth, F4K, and About. A user is logged in as [ikavasidis](#). On the left side, there is a sidebar with options: New Design Window, New Design Toolbar, Export, and Back to video selection. The main content area displays three video frames (Frame 3, Frame 4, and Frame 5) showing an underwater scene with a large rock. Each frame includes a timestamp (2010-09-19 07:00:00, 07:00:00, and 07:00:01 respectively) and navigation buttons for Previous and Next. A progress bar is visible below each frame.

Crowd Sourcing UI 2

Screen 1
Select the images that do not contain the same species

Bad image

Bad image

Bad image

Bad image

Bad image

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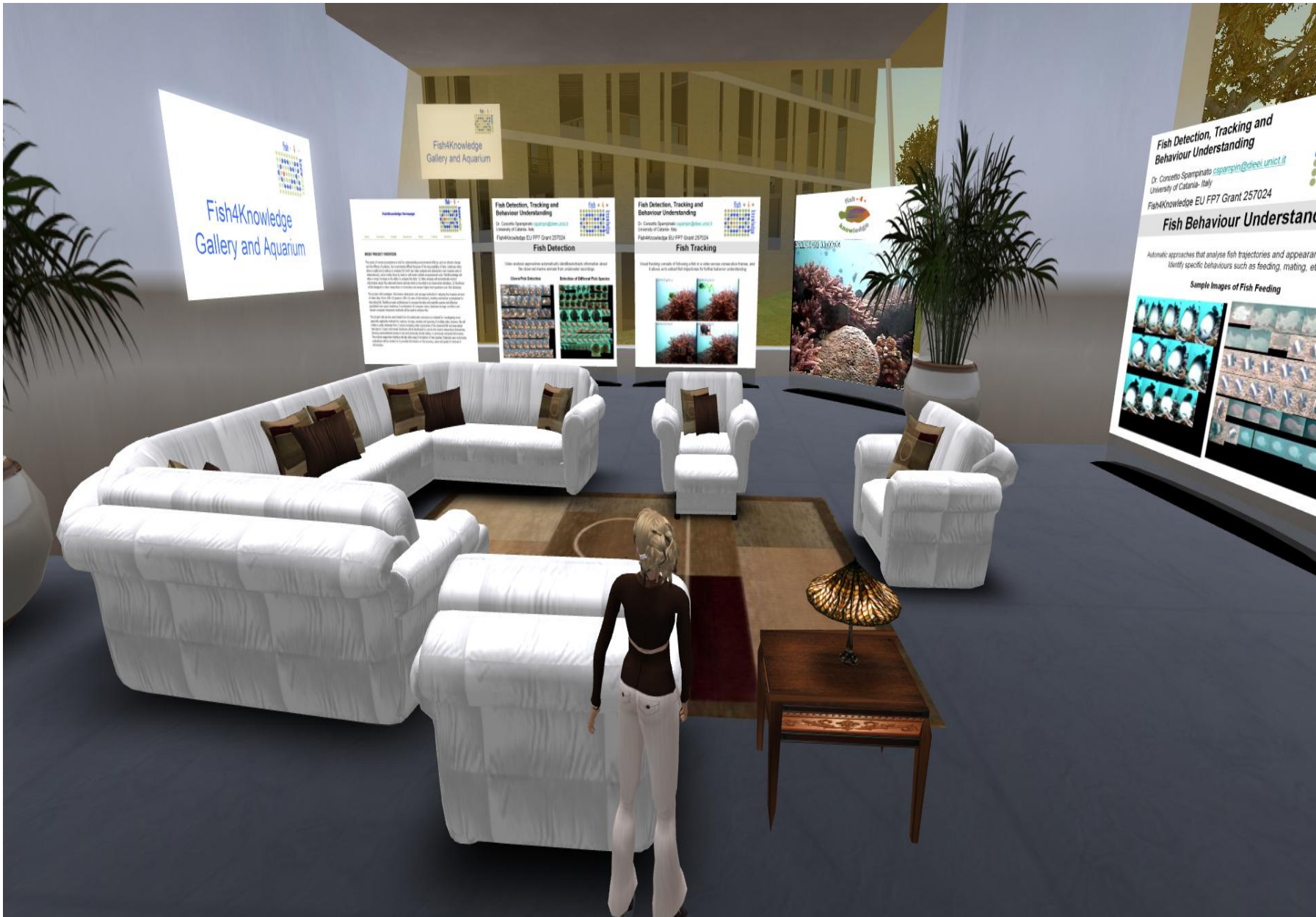
Sample Screen Shots of F4K Second Life Gallery and Aquarium



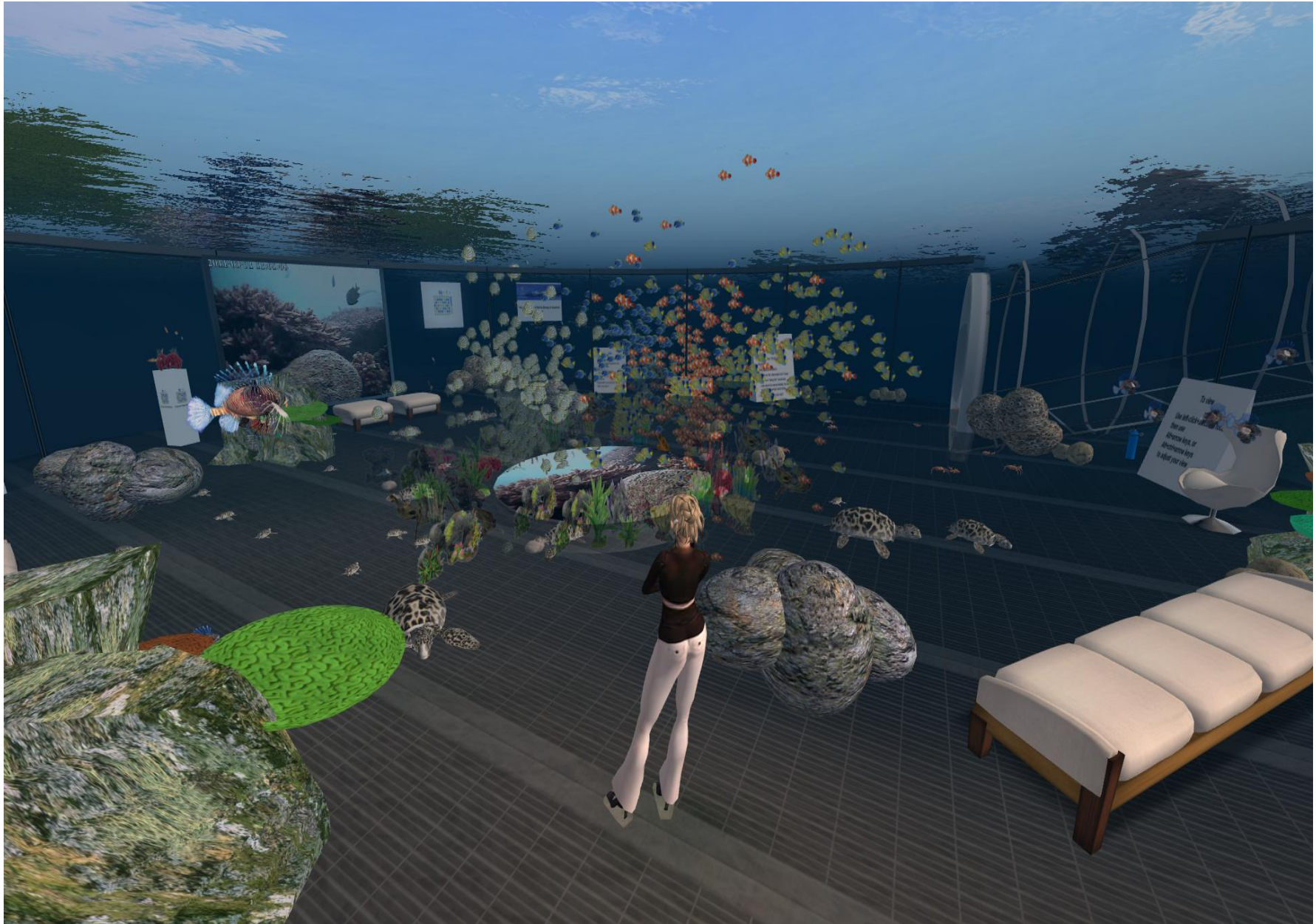












Future Plans

- One follow-on invited session on “Intelligent Workflow, Cloud Computing and Systems” as a part of the KES AMSTA conference, June 25-27, 2012. (Edin Univ.)
- One workshop on "Visual observation and analysis of animal and insect behaviour“, November 2012 (Edinburgh Univ.)
- One workshop on interfaces for ground truth labelling (Catania Univ., Edin Univ., CWI)
- One workshop on HPC applications for image and video analysis/processing (Catania, NCHC and Edinburgh)

Future Plans

- F4K SL project building open day with public lectures in 2012. (Edin.)
- One special journal issue on intelligent workflow and cloud computing and systems (to organise towards the end of 2012) (Edin.)
- One special issue of an international journal on image and video processing (to organise towards the end of 2012 or the beginning of 2013) (Catania, Edin.)
- One book proposal for academic publishing to cover the overall F4K project work and other related work (to organise towards the end of 2012). (Edin.)
- Interacting with Marine Biologists – has invited a few selected group, to establish connections and form an evaluation group



Publications

- G. Nadarajan, Y. H. Chen-Burger, and R. B. Fisher. A Knowledge-Based Planner for Processing Unconstrained Underwater Videos. In IJCAI'09 Workshop on Learning Structural Knowledge From Observations (STRUCK'09), 2009.
- G. Nadarajan, Y. H. Chen-Burger, and R. B. Fisher. SWAV: Semantics-based Workflows for Automatic Video Analysis. In Special Session on Intelligent Workflow, Cloud Computing and Systems, (KES-AMSTA'11), 2011.
- G. Nadarajan, C. Spampinato, Y. H. Chen-Burger, and R. B. Fisher. A Flexible System for Automated Composition of Intelligent Video Analysis. In 7th International Symposium on Image and Signal Processing and Analysis (ISPA'11), 2011.

- C. Spampinato, A. Faro, S. Palazzo, "Event Detection in Crowds of People by Integrating Chaos and Lagrangian Particle Dynamics", Proc. 3rd Int. Conf. on Information and Multimedia Technology (ICIMT 2011), Dubai, UAE, December 28-30, 2011.
- S. Palazzo, C. Spampinato, "Object Tracking: State of the Art and Online Performance Evaluation", Proc. IEEE Int. Conf. on Computer and Management (CAMAN 2012), Wuhan, China, March 9-11, 2012.

Thank you for listening !!

