NCSR National Centre for Sensor Research

RATB Multi-Modal Sensor Network

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DCU

CLARITY
clarity-centre.org

Introduction: This work identifies one or more coastal locations where visual sensing, through cheap and easily deployed web-cam type CCTV devices or satellite imagers, can be used to complement and enhance the usefulness of other sensors, in measuring and tracking some feature of a defined coastal location. This involves the capture and logging of visual surveillance information and aggregation with other data sources for defined locations. The output includes a software tool which gathers visual and other sensed information and a tool which allows a domain expert to study marine events through a multi-modal trust and reputation based event detection system.

Methods- Data collection and data processing

Data Aggregation Software
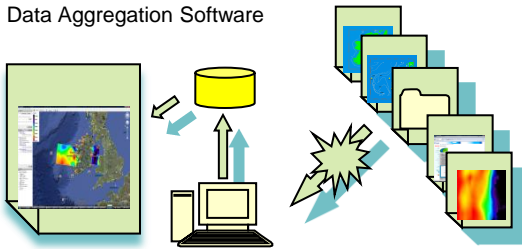
Visual Data Analysis Software
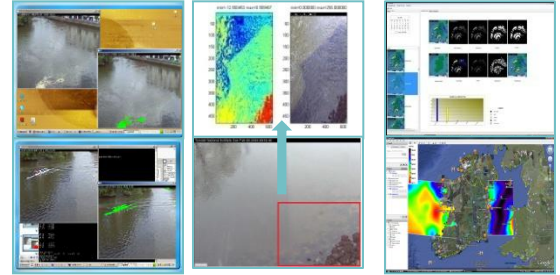
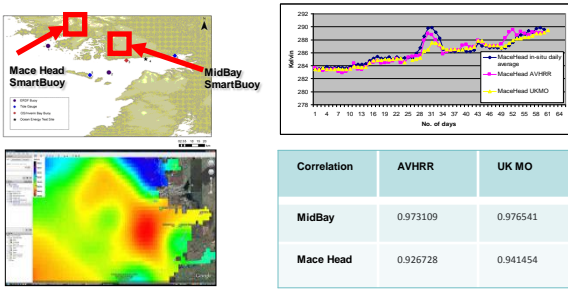## Data Collection - sampling sites and data sources

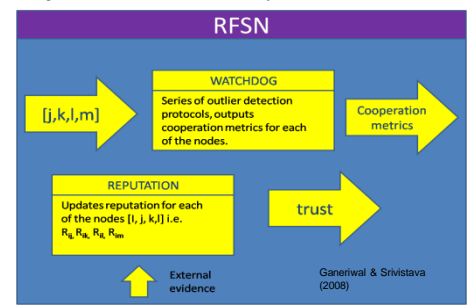| Data Stream	River Lee	Galway Bay	River Tolka
In-situ sensors	SmartCoast, Deploy	SmartBay, Tide Gauge Network, Irish Weather Buoy Network	
Visual/Satellite sensors	Camera at Lee Maltings site	HRDDS, MERIS, AATST, MODIS (currently batch aggregation)	Deployed Garden Watch Cam
Context information	Rainfall Radar Data	Rainfall Radar Data	Rainfall Radar Data
Identified possible future data streams	Further camera installations , publicly available weather and webcam data	Galway Bay web-cam, publicly available weather & web cam data	In-situ sensors, publicly available weather data

Results - River Lee Pilot Study
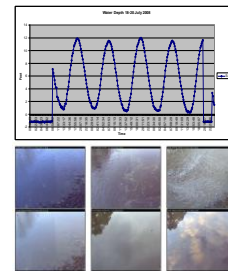
	C_1	C_2	C_3
Classification Error	0.642	0.537	0.302
Classification Rate	0.467	0.732	0.750

Results - SmartBay Pilot Study

Mace Head SmartBuoy

MidBay SmartBuoy

MaceHead in-situ daily average
MaceHead AVHRR
MaceHead UKMO

Correlation	AVHRR	UK MO
MidBay	0.973109	0.976541
Mace Head	0.926728	0.941454

Output tool - Trust and Reputation Framework

RFSN

[j,k,l,m]

WATCHDOG
Series of outlier detection protocols, outputs cooperation metrics for each of the nodes.

Cooperation metrics

REPUTATION
Updates reputation for each of the nodes [i, j, k,l] i.e.
$R_{ij}, R_{ik}, R_{il}, R_{im}$

trust

External evidence

Ganeriwal & Srivistava (2008)

Linking modalities for improved event detection and adaptive sampling
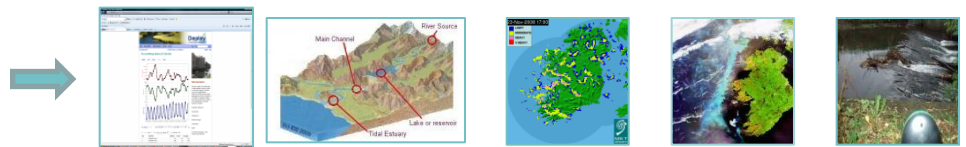
Marine Institute
Foras na Mara

NDP
National Development Plan 2007 - 2013

Beaufort Research Awards in Marine Sensing

SeaChange
Casadh na Taoide

SSTI
Strategy for Science, Technology and Innovation