

	Key words	Remarks
Navigation, Homing and Docking	Basin wide nav (anchor)	Clarify requirements, basin, regional, local scales each with own requirements Common Standards Interoperability
Sensors and Instruments	Bio-chem sensors, water sampling, credibility AUV specific, miniaturization	The way we use them, sharing our experience, lack of interoperability and standards, inter-calibration Need to be harder on, more demanding of our suppliers
Communications	Status, Command, Emergency, Data Link	Lack of interoperability, bounds on acoustic comms, shared acoustic comms and positioning??
Future Technologies	Nuclear power source, Water eating fuel cell	Quality is addictive, New thinking, what if today's technology is as good as it will ever get,
New User Needs	Money, trained personnel, procedures, Science-Engineering-Operations (SEO) Detail planning	Marry science with technology, education to understand risk; national or commercial assets available to users, avoid over-hype, exceed expectations Safety based planning
Deployment and Recovery	Reliability and safety; relocation after mission	Need for procedures, mega long endurance – no need for L and R, Ballons etc for location, in water recharging, interoperability from other vessels,
Autonomy and Obstacle Avoidance	Survivability, context awareness for fault appreciation and response,	Autonomy is not intelligence, 90% probability mission completion with 99.5% survivability, collision avoidance; collision detection and avoidance
When Things go horribly wrong	Preplanning, arctic checkoffs Weather, ice forecasts, Don't panic, crew training	Act as a prudent uninsured, reliability engineering; spares, hot and cold, 400 KHz relocation beacon, Think before calling the insurance man, plan and prepare
Risk Assessment and Mitigation	Sharing data	Build 2, test a lot, use fault trees, religiously log faults and analyse, operator training , formalized risk management. Timely education of sponsors re real risk anticipated
Future Campaigns and Missions	International working group, collaboration	AUVs can do things that no other system can do in ice covered waters. Bio chemical users to the foreground, need for high viz successes, raise awareness, think 5 years,

