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Environmental Monitoring Platform - Current Status



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Real-Time Water Quality Monitoring Workshop
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Outline

- Ideas and concept
- Type of equipment
- Designing the trailer
- Putting the equipment together
- Communication with the trailer (Dave)
- Current Status – moving forward



Why not continue with grab sampling programs?

- Limitations inherent with traditional grab sampling
 - Sample collection usually decided by factors not based on water quality – Availability of personnel, summer students, program schedule (once a month, once a quarter, etc)
 - Very few samples collected on week-end or during night-time
 - Few samples collected during storms – most SOPs tell you to avoid going out when weather is bad...
- Limitations with current event-based sampling
 - When an event triggers sampling, it's chaotic to get samples to the laboratory without the sample being compromised



Design of an Environmental Monitoring Unit

- Easily moveable with typical work truck
- Appropriate size for field work
- Refrigeration capabilities
- Quick deployment and removal
- Flexible floor space for different uses
 - Mobile field laboratory
 - Enforcement support
 - Mobile real-time station
 - General all-purpose trailer
- Secure storage of the equipment
- Advanced communication capabilities



Monitoring Equipment List

- Water Quality Sonde(s)
 - Basic WQ parameters (Hydrolab, YSI)
 - Advanced WQ parameters (s:can)
- Air Temperature and Humidity
- Rain Gauge
- Wind Speed and Direction
- Flow/stage measurement
- Autosampler(s)
- Refrigeration Unit
- ...more to come as we start using it



A pilot study...



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Setting up the Trailer

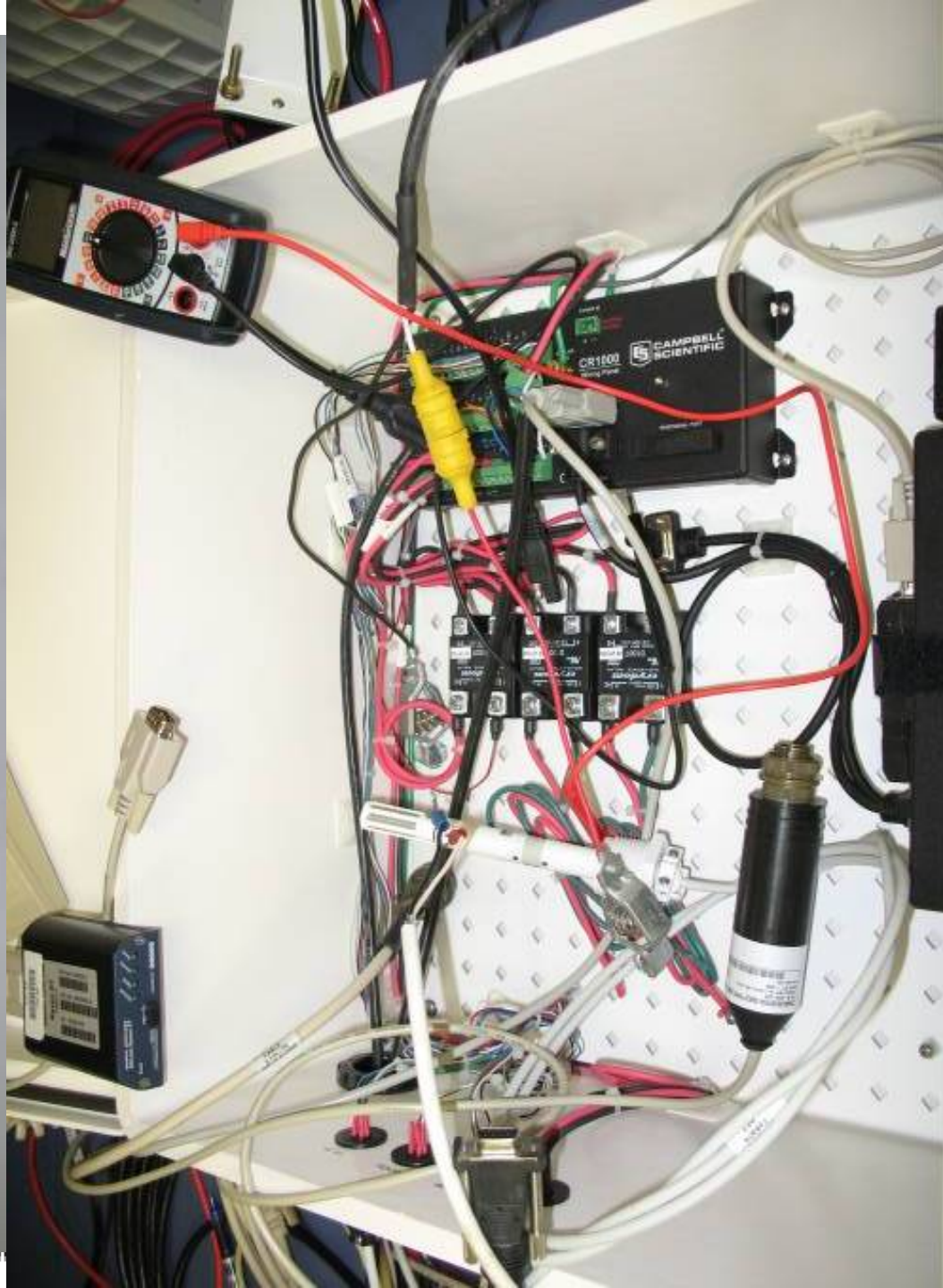
- Plan of attack
 - Use the CR1000 Data Logger as 'Central Command'
 - Connect the Air Monitoring Equipment
 - Connect the Realtime WQ Sonde
 - Connect the Autosampler(s)
 - Establish Communication with logger
 - Design interface to read the data
 - Design field deployment tubes
 - Deploy in field



Equipment is received...



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...Relax, it's plug and play



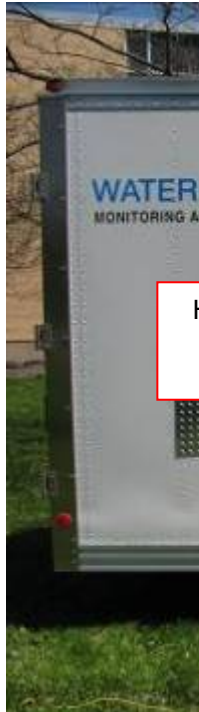
Issues we faced

- Air Monitoring Sensors need a cable 30' long to reach top of the trailer – most did not have required length
- Need way to attach sensors to the top of the pole without climbing on top of trailer – safety issue
- Autosamplers are not 'accustomed' to taking external directives – needed special cable and lots of trial and error to get it to work
- Wanted to be able to quickly get the equipment in and out of the trailer for multiple uses within our dept.
- Others on a daily basis...



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External Directions to Autosamplers

- Autosamplers usually don't take directions from external logger
- Custom cable required
- Trial and error eventually achieved success.





Communication with the trailers (Dave)

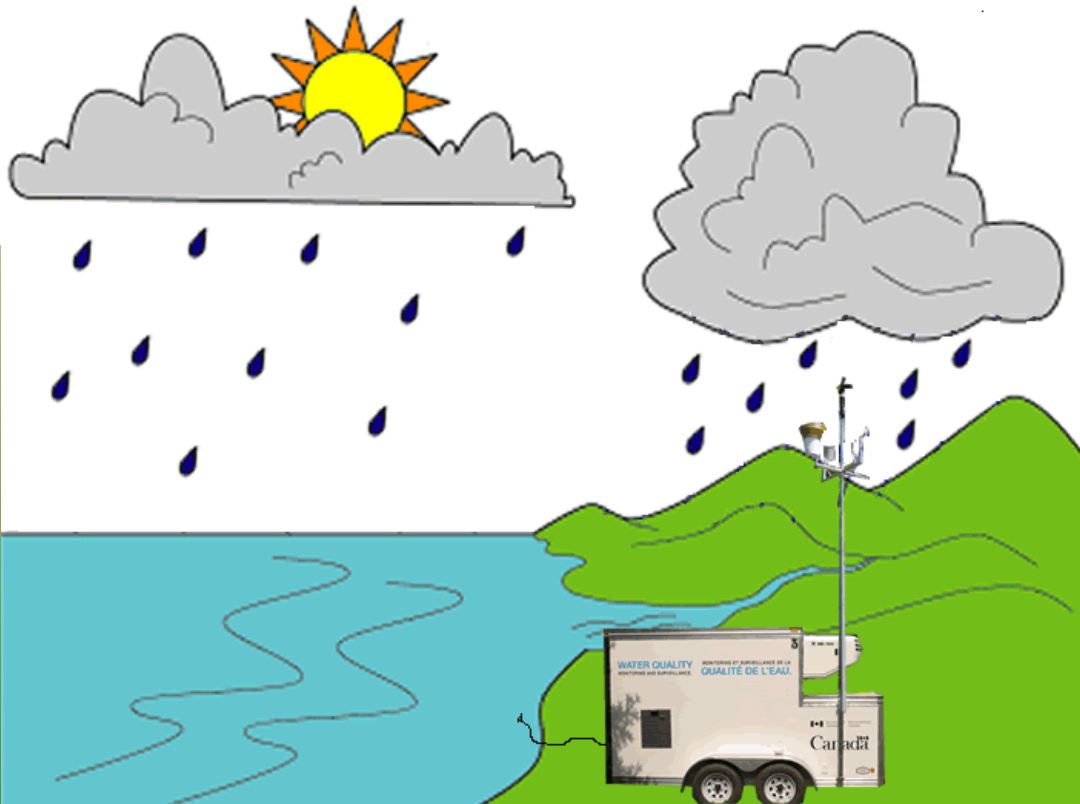
- Controlling trailers remotely
- Technology used
- Specifics on how it works
- Real life scenarios



Distance Issue

Maintenance Required + Distance to Site = Major Time and Data Loss

- Trailer is multifunctional (many potential changes needed)
- Need to have control over trailer at all times.
- Need to know what's going on at all times.
- Usually long distances.
- Travel is costly.



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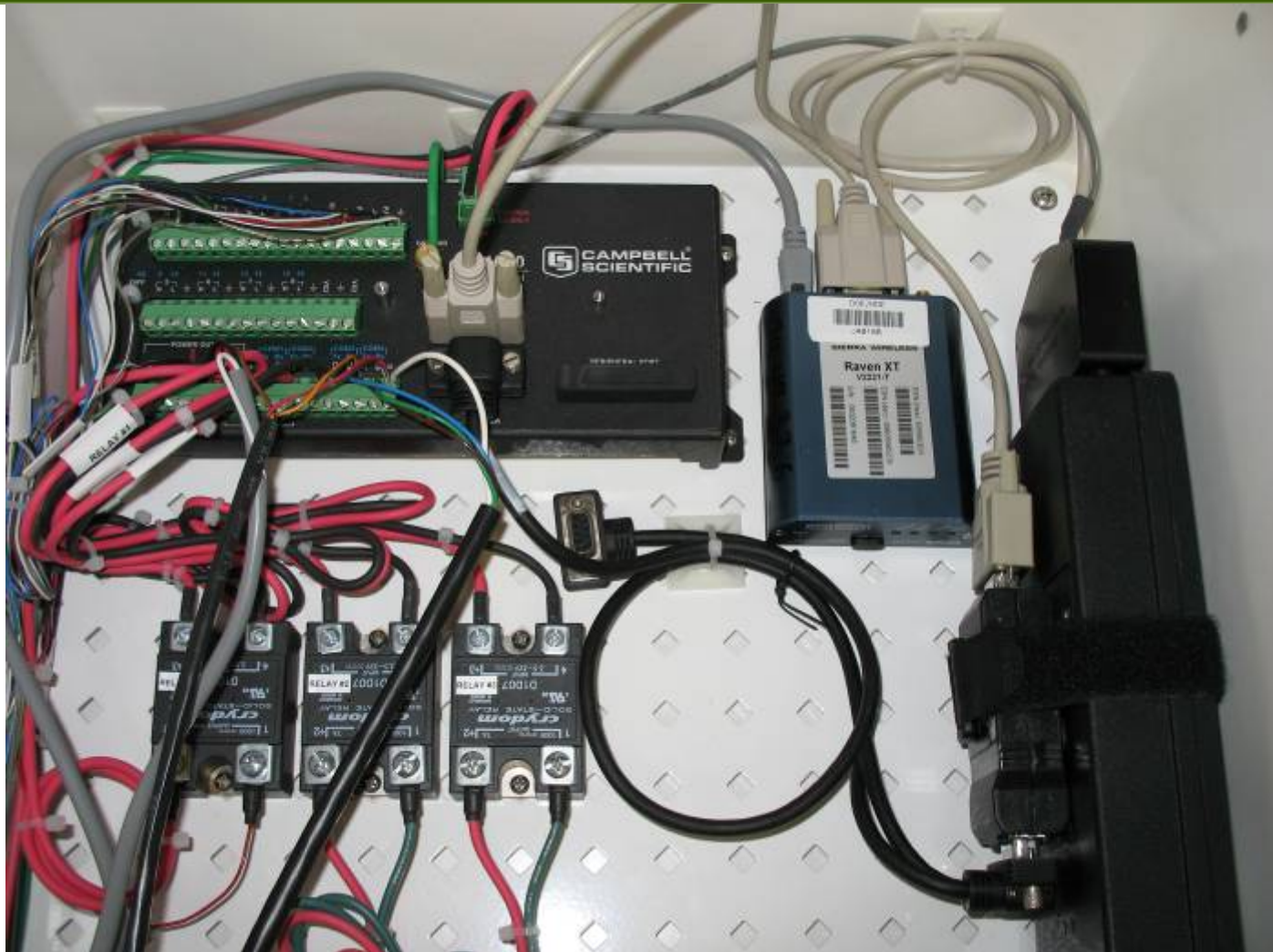
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Far away at the office....



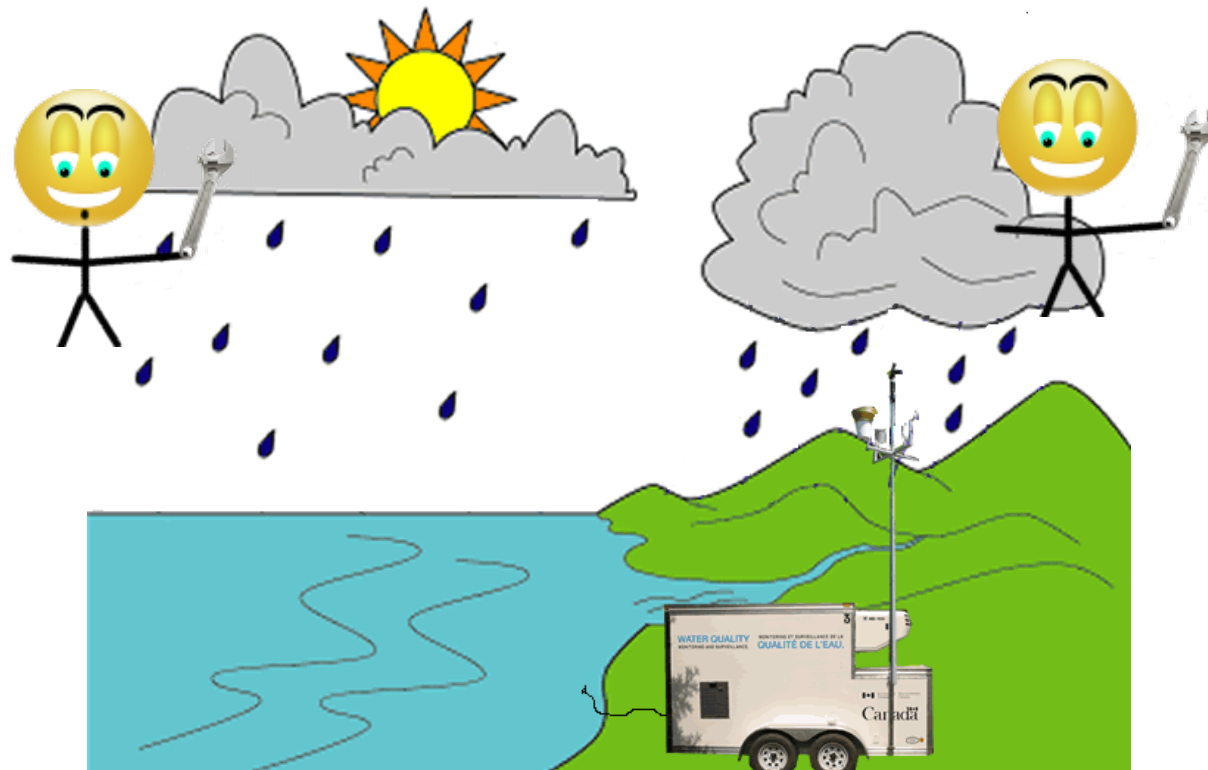
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Solution: Remote Communication



Virtually There

- View live weather data
- View live water chemistry data
- Visually see weather using a remote camera.
- Get alerts when special event occurs
- Fix problems in real time.
- Make updates to control how system performs.



How Its Done / What We Can Do

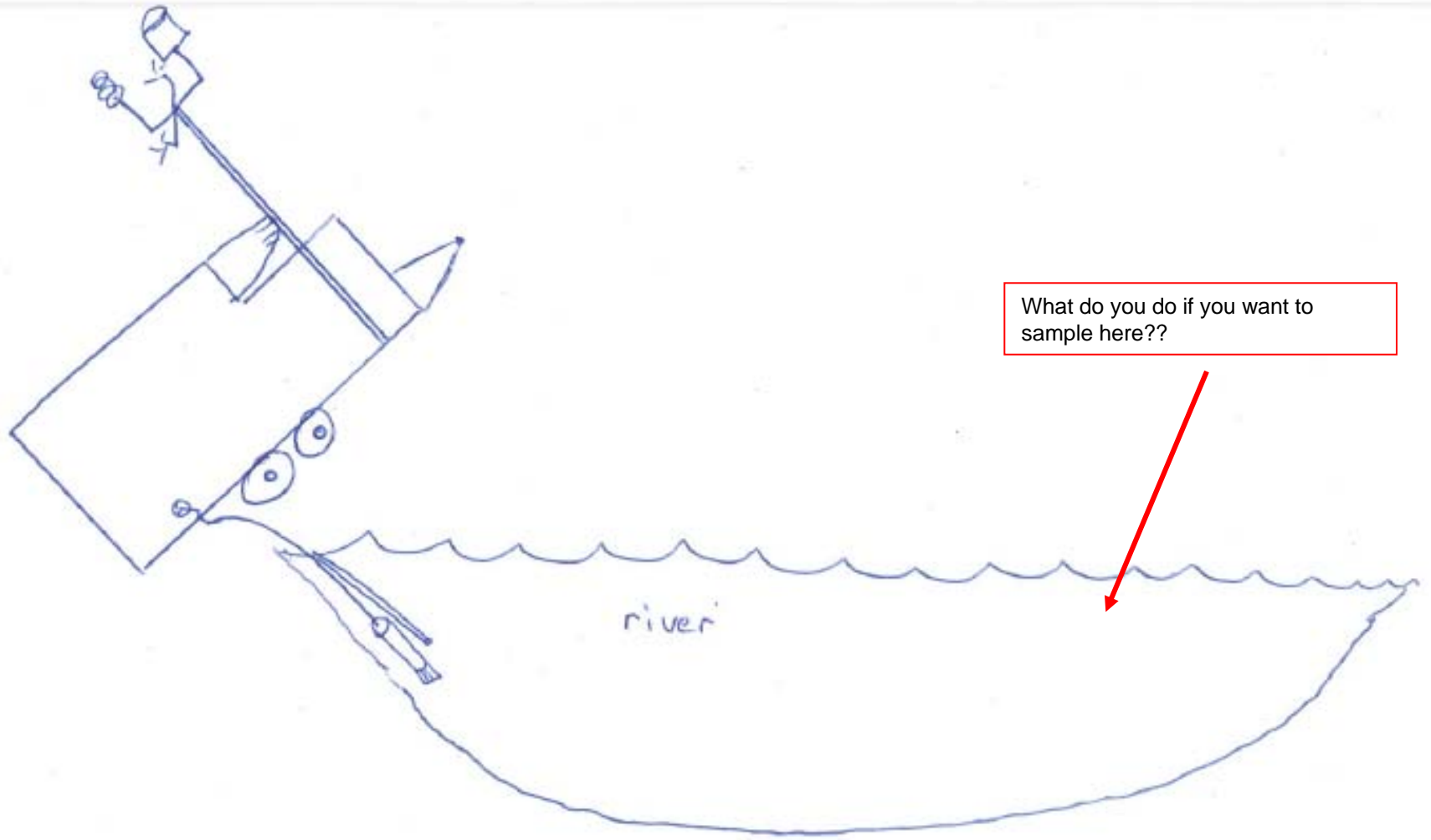
- Data Logger: more than just a “logger”.
- Data Logger has programs that control:
 1. When sensors take and/or store readings
 2. Tell autosamplers to take a sample
 3. Store data on specified time intervals
 4. Send an alert (sample is taken or problem occurs)
- Connect to Data Logger from office using Loggernet.
- Once connected we can:
 1. View live data
 2. Download data (can be automated)
 3. Modify program running on Data Logger.



Scenarios

- Triggering samples on rain events
 - 20mm one day same effect as 7mm over 3 day period.
- Triggering samples based on water chemistry changes.
 - Water Chemistry at different locations may mean different things.
 - Lower fluctuations of different parameters may mean different things at different sites
- Vandalism
 1. Motion sensor triggers series of pictures.
 2. Logger sends alert to office, we check pictures, determine action.
- Temperature inside trailer out of range.
 - We need to preserve samples.
 - If out of whack, travel there to fix.





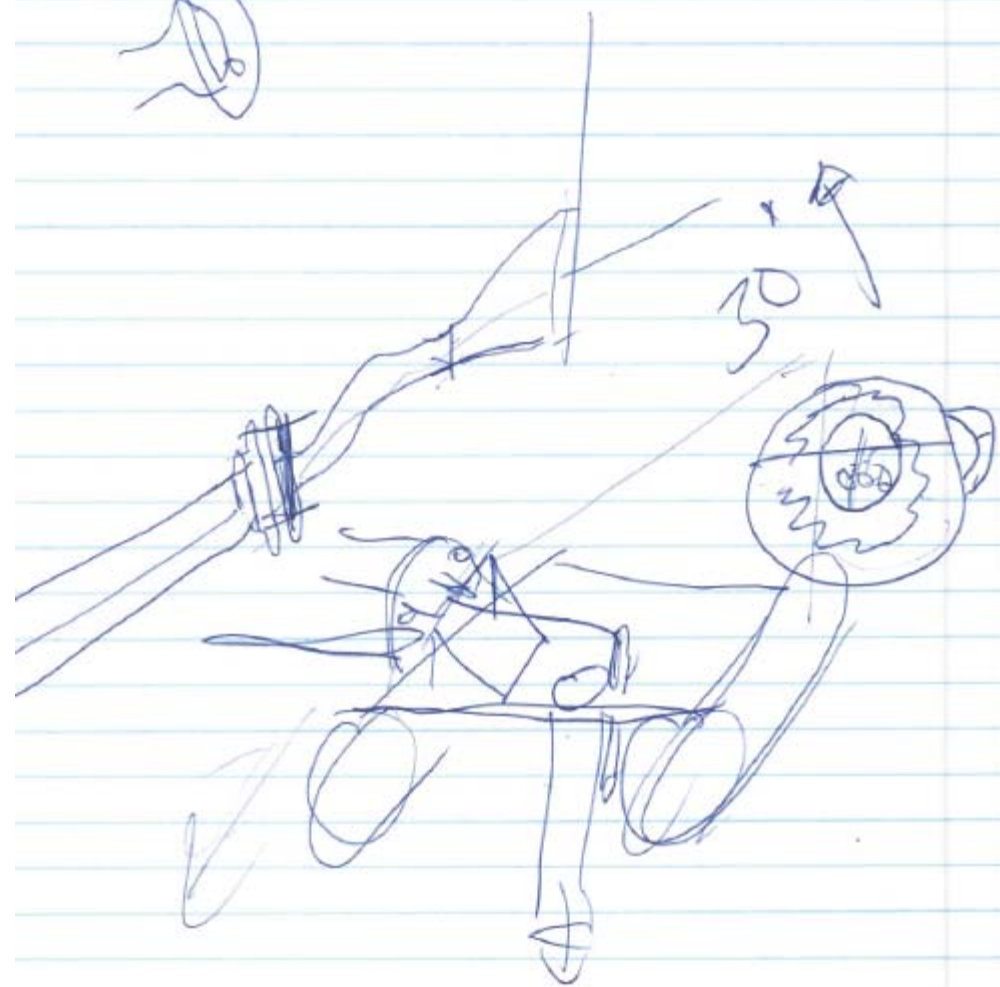
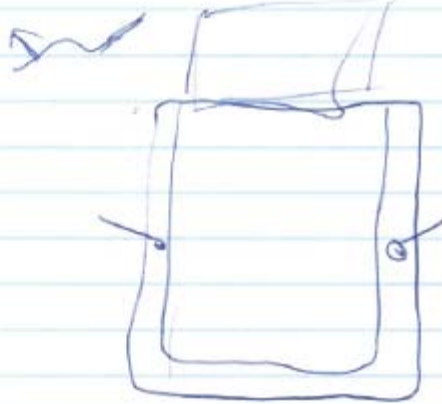
What do you do if you want to sample here??



Need for Floating Dock/Platform

- To deploy at several locations/depth in river/lake, we need some sort of floating dock or platform that we can anchor in place
- Platform needs to be heavy enough to bare weight of real-time probe(s) and potentially solar panel and battery to pump water back to the trailer
- Time to get creative again...



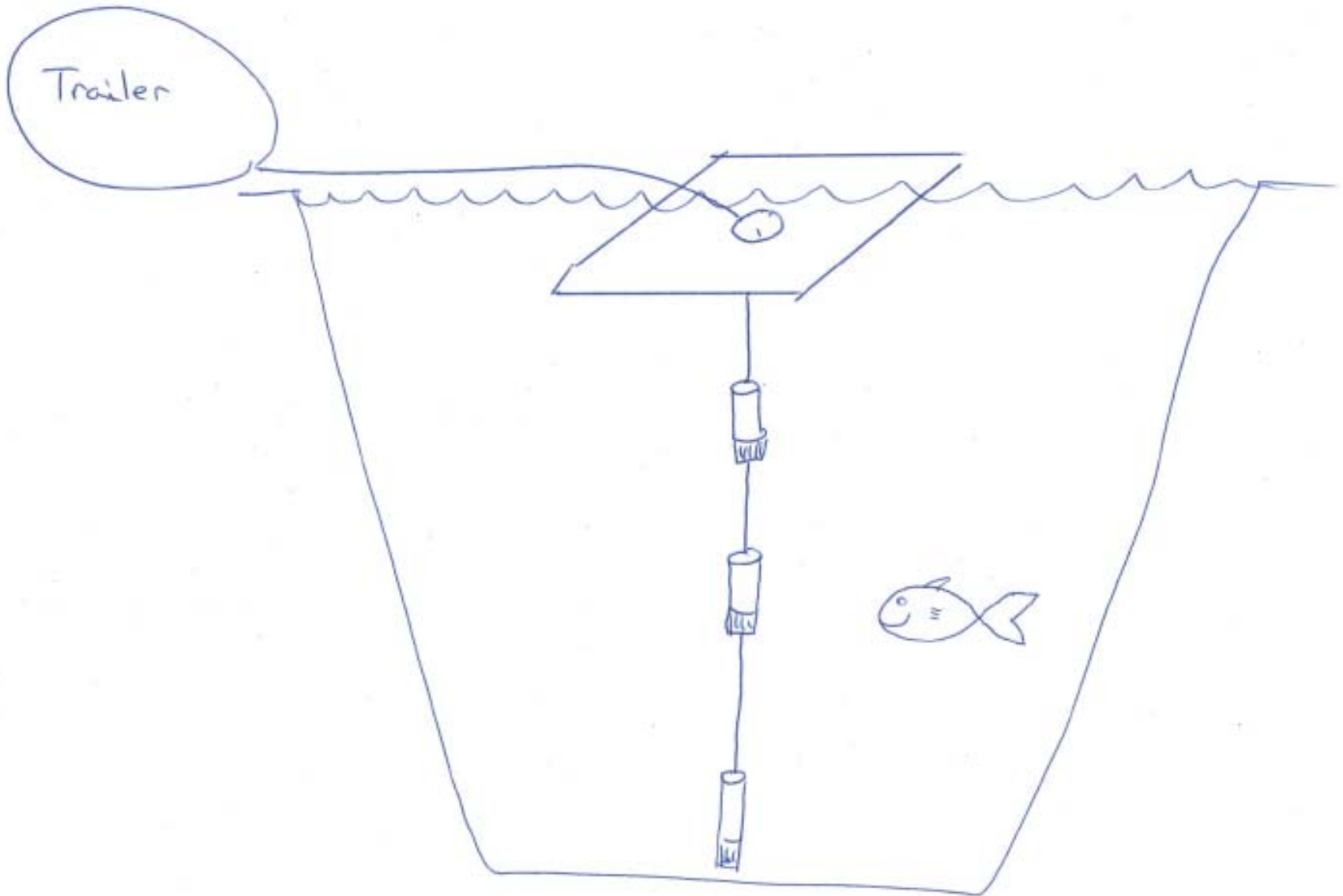


Design of Floating Platform

- Needs to be anchored – different lengths for different locations
- Needs to be stable in the water
- Needs to bare weight of batteries, solar panel, pump etc.
- Deployment of Sonde needs to be stable in water as well
- Quickly became apparent we need professional help...



Other Deployment Possibilities...



Conclusion

- Allows monitoring at targeted locations
- Allows for quick response to events
- Program visibility and profile raised to another level
- Flexible design allows for quick change out of trailer
- Made so that future technologies can be accommodated



Thank you!

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