Open Source EID HW & SW

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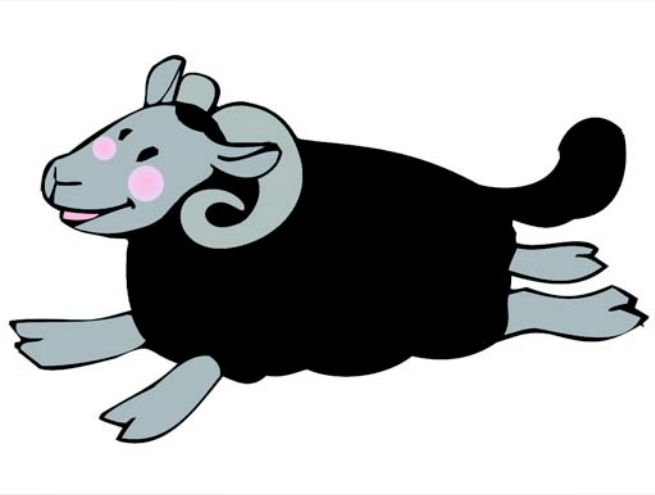
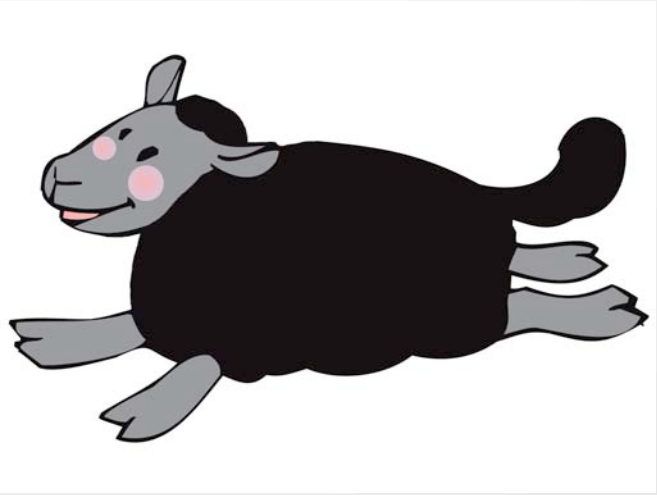




Why are we here?

- Our goal is not to make $ on this but to enable the sheep raising community use appropriate technology.

What is Open Source?

- Free as in Freedom not Free as in Beer
- Free to use
- Free to modify
- Leverage many developers worldwide
- Often quicker to handle new technology
- Developers “Stand on the shoulders of giants”

The 4 Open Source Freedoms

- The freedom to run the program for any purpose.
- The freedom to study how the program works and change it so it does your computing as you wish.
- The freedom to redistribute copies.
- The freedom to distribute copies of your modified versions to others.

Status of EID Worldwide

- Australia
  - Varies by State
  - Tagging Required – Can be EID
- New Zealand
  - EID Mandatory for Cattle & Deer
  - Optional for sheep
- Canada
  - EID Mandatory for Sheep as of 1 Jan 2013

Status of EID Worldwide

- United Kingdom
  - Double Tagging Mandatory for Sheep as of 1 Jan 2010
  - 1 Tag must be EID
  - Can use Rumen Bolus in place of EID tag but still need visual tag
  - Slaughter lambs under 1 year rules vary by country
- United States
  - Tagging Required for Sale or Transport
  - EID is an option but not required

Why Use EID?

- Allows you to track Individual Sheep
- Performance Data
- Disease Monitoring
- Movement Monitoring
- Reduce Tag Reading Errors
- Attach to Automatic Sorting and Weighing Equipment

When does EID make sense?

- Making Genetic Changes to your flock
- Scrapie Free Export Flocks
- NSIP or other Performance Recording (LambPlan, EBLEX, Signet etc.)
  - Weights
  - Ultrasound Scans (Fat Depth, Loin Eye and Pregnancy)
- Disease Status and Recording
  - Brucellosis
  - OPP
- Breeding and Lambing Data Recording
  - Recording labor and number of assists (Pulling lambs)
- Reduce Labor costs

Why We Personally Need EID

- We are an Export Qualified Scrapie Free flock
- We record NSIP data
- We need detailed lambing records for our work with the USDA on artificial insemination
- We are an OPP Free flock and test regularly
- We are working to improve our flock performance on a number of management characteristics
- We invariably misread 1-2 tags every time we work the sheep
  - This means we have to put all the sheep back through to verify tag numbers costing us time and labor. In this heat it's a real PITA!
  - It's just us, we are unlikely to get more accurate as we get older!
- We are not a hobby flock but are small and can be an experimental flock

EID System Requirements

- EID Devices
  - Microchip
  - Rumen Bolus
  - Ear Tag
- Software for Handheld Devices
  - Typically task oriented
  - Subset of total data
- Reader Hardware
  - Handheld
  - Computer Connected
  - Chute Side
- Software on Desktop Computers
  - Easy to edit and update

What EID Isn't

- Cannot track sheep at distance
  - You must be within touching distance to read an EID device
  - Cell phone collars exist prices range from $100-300 each
  - Satellite collars start at $500 each
  - GPS requires good view of the sky
- Communications Infrastructure does not exist on range
- This would sure be nice but not today. Give it another 15 years or so and perhaps.

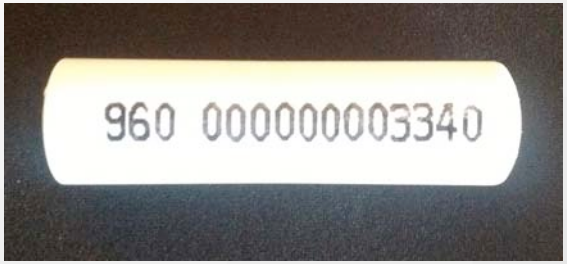
EID Devices

- Microchips
  - Implanted behind ear
  - Can Migrate
  - Fragile
- Rumen Bolus
  - Can Be Reusable
  - Expensive

Not suitable for use in sheep, esp. rams.

Processors won't recover

Cannot be read w/o equipment



EID Devices

- Ear Tags
  - Many Styles
  - Can be very inexpensive
  - Human Readable
  - Easy to Apply
  - Standards ISO 11784/11785
  - HDX and FDX
- Various Manufacturers
  - Retention rates vary
  - Costs vary

Some Common EID Ear Tag Companies

- Allflex - US
  - Button & Flag Styles
  - $1.75-$2.90
- Y-Tex - US
  - Flag Style
  - $3.39-$4.00
- Destron Fearing - US
  - Button Style
  - $2.35
  - Bought Out by AllFlex
- Shearwell - UK
  - SET Tag
  - $1.09 EID only
  - $1.40 Pairs (Visual & EID)
- Ritchey - UK
  - Snapp Tag
  - $1.40 Pairs (Visual & EID)
  - Competes with Shearwell

US – Optional

UK – Mandatory

Shearwell SET Tags

- Very low cost
  - $1.49 each including Shipping from UK
  - 200 tags $ 218.31 Shipping from UK $75.78
- Very good retention
  - Canadian 2 year trial
  - 46,538 tags applied
  - 332 tags reported lost 0.7%

- Not approved as US Official Scrapie Tags... Yet
  - They are looking for a US Company to be the Agent. Have applied as official tags for sheep, goats, deer and elk.

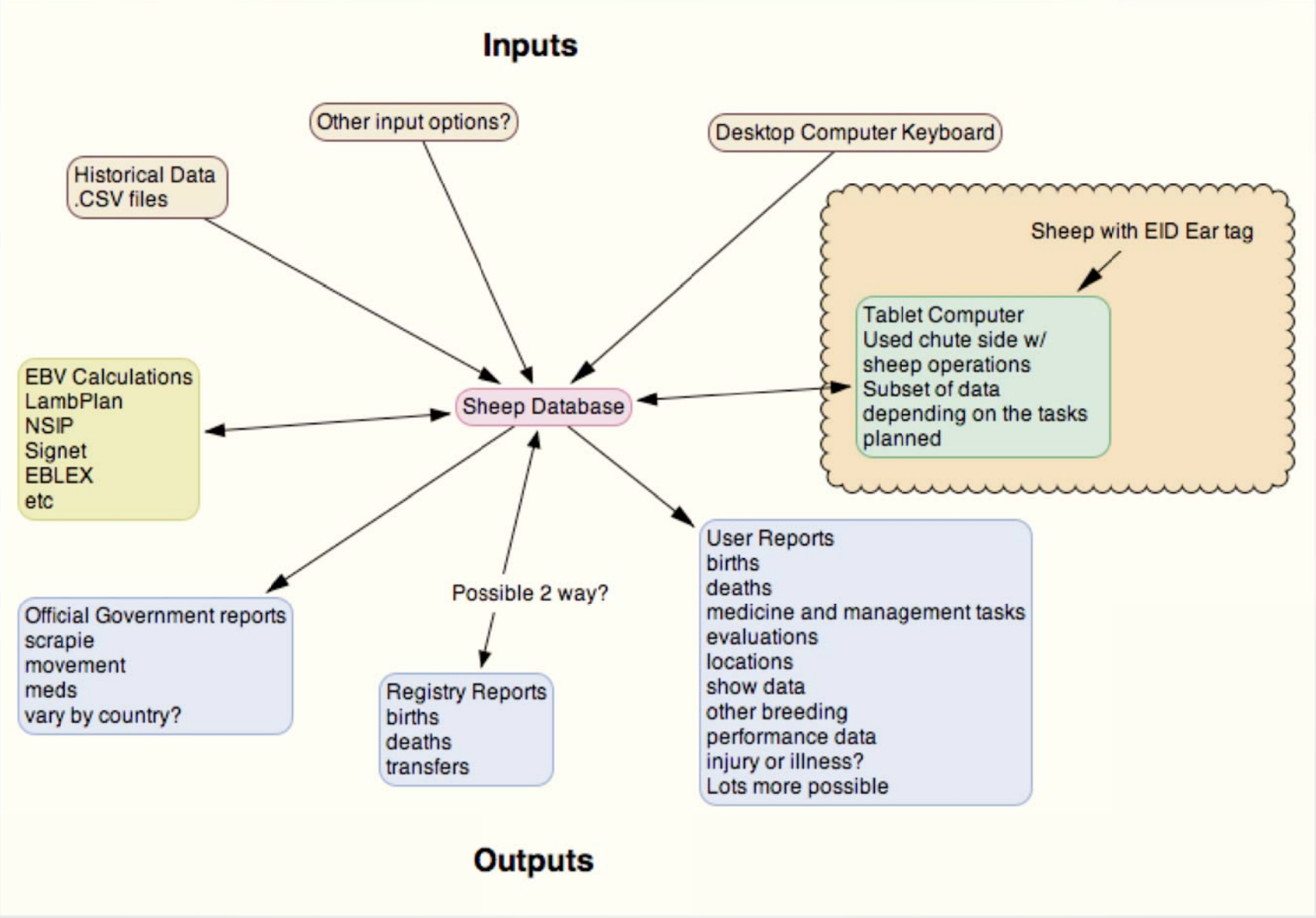
EID Reader Hardware

- Pocket or Portable Devices
  - Some are attached to computer
  - Prices range from $400-$850 or more
- Panel Readers
  - Used in raceways, chutes and on scales
  - Can talk to sort gates
  - Prices start at $3900 and go up
  - Usually integrated with computer
  - Out of our scope but could be added

Ground Rules for Our System

- Must be Open Source
- Readily available hardware parts
- Free software development tools
- Development environment on Macintosh, Linux and Windows systems
- Use a standard, portable, cross-platform programming language (Java)
- Use a standard, portable, cross-platform database (SQLite)
- What does this all mean?

Overall System Design



Our Current Software Design

- LambTracker Handheld Version
  - Android™ Application written in Java
- LambTracker Desktop Version (Not Started Yet)
  - Application will be written in Java
  - Leverage off the handheld system
- Database is using SQLite
  - Common to both Handheld and Desktop

Our Hardware Design

- RFID Reader Module from Australia $43 + $19 shipping (Reads both HDX & FDX-B tags)
- Antenna (Included with reader but options are available)
- Bluetooth Radio $10-15
- Battery Pack Varies
- Plumbing parts under $10
- Total Cost Under $100
- You need to be a “hobbyist” to build one.

Why Android?

- 2 Choices for handheld - Apple iOS and Android™
- Apple requires a license to use bluetooth in your application
  - Secret Agreement
  - Undetermined cost
  - Undetermined Ts&Cs
  - Requires special chips in your device i.e. custom hardware
  - App has to be approved by Apple
- Android™ has an open bluetooth environment
  - Uses any standard bluetooth radio
  - Open Source Development Environment
  - Access is easy

Why Not Windows?

- We don't have any Windows Development capability
- Since the Desktop version will be written in Java it may “Just Work”
- Open Source means anyone is welcome to fix any problems that occur or develop in a direction that we don't want to.

Why Not Windows Handhelds?

- Windows Phones and Tablets is a small population
- Tablets are very expensive i.e. Microsoft Surface
- Phones have limited capability and failing in marketplace
- This may change in future but not for now

What's Running Now?

- LambTracker SW has a subset of our lambing data
  - Federal, Farm and EID (if present) ear tags for all of our breeding ewes
  - Sheep Name
  - Birth Date
  - Birth Weight
  - Birth Type
  - Lifetime Lambing Summary
  - 2012 Lambing Results
  - 2013 Lambing Results
- EID Reader Works
  - Can look up, edit and add sheep data based on tag entry

Demo vs Planned Database

- Demo Software
  - Database is a single monolithic table
  - Difficult to get set up
  - Does not follow good database design practices
- Planned Software
  - Proper Relational Database design
  - Ease of set-up and editing
  - Robust design to allow for expansion of types of records kept

What Next?

- LambTracker Source code has been uploaded to public repository
- Put management Shearwell EID ear tags in all of our breeding sheep
  - We have 200 tags – Now for a Round Tuit
- Create real SQLite Database structure for all of our critical data
- Develop Java front end for desktop version of LambTracker
  - Database entry
  - Create subsets for handheld tasks
  - This may become a suite of different applications
- Continue Field tests over the next year(s) with existing hardware and software

Expand SW for our Flock

- This is one Flock's Perspective, YMMV
- This is a work in progress. We have no idea how long it will take. We are focusing on these 4 pieces:
- Detailed lambing records
- Collection of weight data for NSIP
- Official Scrapie Flock Inspection Reports
- Drug/Wormer administration and slaughter withdrawal data

The shoulders we stand on

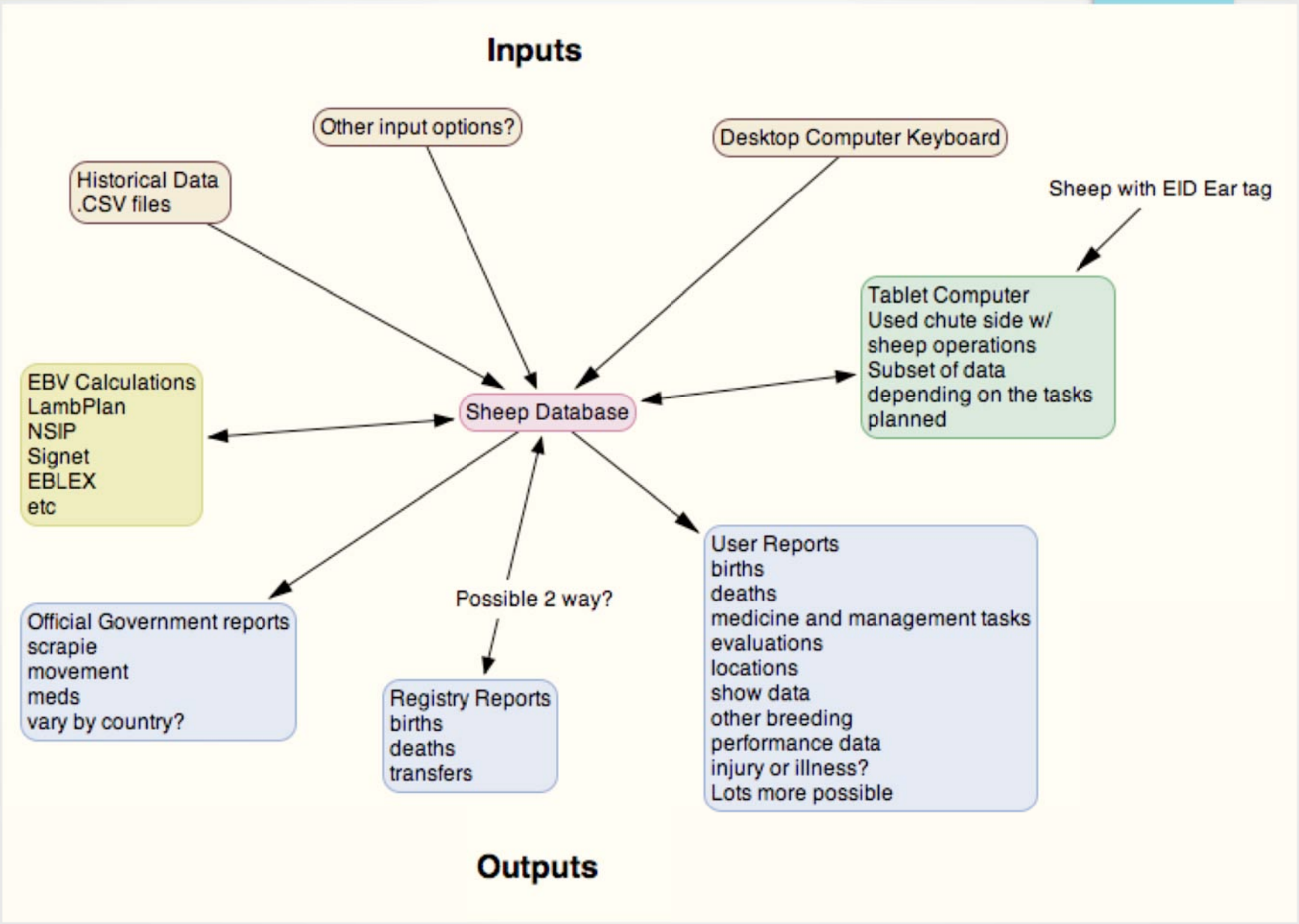
- Dr. Dan Love
- Dr. Susie Hirsch
- Dr. Phil Purdy
- Dr. Wayne Wiitanen
- Neil Oughton
- Eric Coker
- DXR
- Ray McGuinness
- Revolution Brewing
- Google
- Sun Microsystems & James Gosling
- Shearwell UK
- Allflex US
- Priority 1 Design
- Linus Torvalds
- Dennis Ritchie & Ken Thompson
- Donald Chamberlin & Raymond Boyce

For More Information

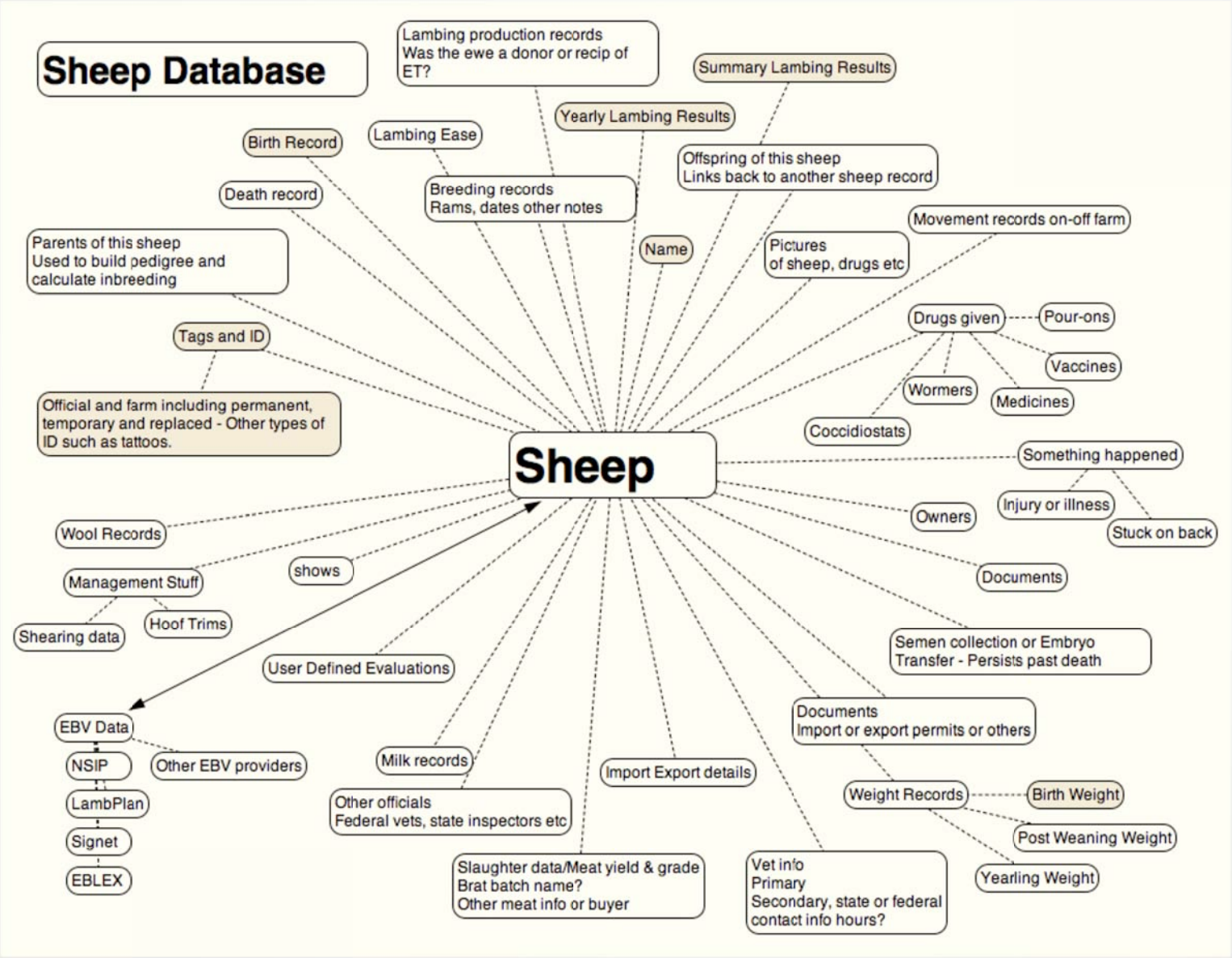
- Hardware Design on GitHub now
  - However, it's missing lots of details, by design.
- Presentation and information on our website
  - http://www.lambtracker.com
- Source Code on GitHub now
  - https://github.com/OogieM
- Got Questions? Contact us
  - oogiem@desertweyr.com
  - kenm@desertweyr.com
  - 970-527-3573

Androids DO dream of Electric Sheep... Maybe

Overall System Design



Sheep Database Overview



Data Model of Demo SW

- SQLite database has a single table, sheep_table, which contains
  - _id the primary key
  - eid_tag
  - fed_tag
  - farm_tag
  - sheep_name
  - birth_date
  - birth_type
  - birth_weight
  - sheep_task (Used to hold summary lambing results)
  - lambing_2012 (2012 Lambing details)
  - lambing_2013 (2013 Lambing details)

Data Model of Planned SW