

DeCAIR: Developing Curricula for Artificial Intelligence and Robotics

Report on Surveying Facilities and Labs

Activity Information

Work Package	WP1 – Surveys and Needs Identification
Task	1.5 Survey of facilities and equipment
Activity Coordinator	JUST (Wafa Batayneh)
Participating Partners	TTU, UJ, JUST, LU, BAU, UGR, UNIGE, UST, UNIPI
Objective(s)	<ul style="list-style-type: none">• Assessment of existing facilities and equipment in universities of Partner Countries• Identifying the initial list of equipment to be ordered• Surveying equipment in universities of Program Countries
Due Date	March 10 th

Instructions

1. Activity coordinator is to communicate with the focal point of UJ, TTU, LU and BAU and request each of them to fill Table 1.5.1 and Table 1.5.2.
2. Activity coordinator is to communicate with EU partners and request each of them to fill Table 1.5.3.
3. This report is to be prepared through collaboration of different partners and submitted to the WP lead by the activity coordinator. Filled tables should be added to this report.

Summary and Recommendations

In this task the main objectives were the assessment of existing facilities and equipment in universities of Partner Countries and Program Countries. This was accomplished through collecting and analyzing the following listed surveys:

1. Assessment of Existing Labs in the Universities of Partner Countries
2. Preliminary List of Needed Equipment to Order through DeCAIR Project
3. Detailed List for Labs Equipment in Universities of Program Countries

The first survey considers the assessment of existing labs in the universities of Partner Countries, namely; UJ, JUST, TTU, LU and BAU (Table 1.5.1). The collected information shows large variation between the partners in terms of existing equipment, but they all agree on that the available equipment in the labs is of low to medium specifications with high priority to upgrade most of the existing equipment. Generally, they agreed that the existing equipment are sufficient for teaching the basic courses; however, they are not suitable for teaching and research purposes in AI and Robotics which require much higher specifications. Some of the existing labs can be upgraded with better equipment to serve AI and Robotics needs. In other cases, there is a need to create new labs with modern high-end equipment that can be ordered through the DeCAIR project.

The second survey is about collecting information regarding the preliminary list of needed equipment to be ordered through the DeCAIR Project by the Partner Countries, namely; UJ, JUST, TTU, LU and BAU (Table 1.5.2). The collected information shows high priority for upgrading most of the existing equipment, in addition to the need to order new equipment that will serve AI and Robotics program needs, or new lab with modern high-end equipment can be established through the DeCAIR project.

In the third survey, the information about the available AIR equipment in the universities of Program Countries, namely; UGR, UNIGE, UST, UNIPI (Table 1.5.3) is collected. The collected information shows that most of these equipment is necessary and important for AI and Robotics labs, and it provide us with ideas to upgrade and establish labs in Jordanian and Lebanese universities.

In conclusion, the collected surveys gave a clear idea on the list of existing equipment, and the list of potential equipment that can be provided through the DeCAIR Project. In addition to a list of existing equipment in the EU Universities of Program Countries, which provide us with different ideas on AI and Robotics equipment that will be beneficial for the partner universities. At this point we can move to the next work packages with a clear view of the existing and needed equipment for each partner university.

Assessment of Existing Labs and Preliminary List of Needed Equipment in Universities of Partner Countries

Table 1.5.1 Assessment of Existing Labs

Partner Name	The University of Jordan	
Targeted Program(s)	B.Sc. in Computer Engineering (Existing) B.Sc. in Mechatronics Engineering (Existing) M.Sc. in Computer Engineering and Networks (Existing) M.Sc. in AI and Robotics (to be established)	
Existing Labs Supporting AI and Data Science		Priority to Upgrade (High, Medium, Low)
<i>Lab Name 1</i>	<i>List of major equipment</i>	
Existing Labs Supporting Robotics		Priority to Upgrade (High, Medium, Low)
Embedded Systems Lab	<i>Intel(R) Core(TM) 2 Quad CPU Q9550 @2.83GHz, 2 GB RAM</i> <i>500 GB HDD</i> <i>25 Kit of Microchip 1427bww Kits for PIC16F877A</i>	Low
Other Existing Labs Supporting AIR		Priority to Upgrade (High, Medium, Low)
Computer Applications Lab	<i>21 PCs - Intel(R) Core(TM) 2 Quad CPU Q9550 @2.83GHz</i> <i>(4 CPU, 4GB RAM, 500GB HDD)</i>	Medium
Digital Logic Lab	<i>Intel(R) Core(TM) 2 Quad CPU Q9550 @2.83GH, 2 GB RAM</i> <i>500 GB HDD</i> <i>25 Kit of FPGAs (Altera FPGA-DE2 70)</i>	Low
Computer Design Lab	<i>1 PC Intel(R) Core(TM) 2 Quad CPU Q9550 @ 2.83 GHz, 2 GB RAM</i> <i>500 GB HDD</i> <i>20 PCs Intel(R) Core(TM) 2 Duo CPU E8400 @ 3.00 GHz, 2 GB RAM</i> <i>256 GB HDD</i>	Medium
Computer Networks Labs	<i>21 PCs Intel(R) Core(TM) i5- 4440 CPU @ 3.1 GHz, 8.00 GB RAM, 500 GB HDD</i>	Low
Summary and Notes		
<p>Available equipment in the labs in the Computer Engineering Department are of low to medium specifications. Generally, they are sufficient for teaching the basic computer engineering courses; however, they are not suitable for teaching and research purposes in AI and data science which require much higher specifications. Some of the existing labs can be upgraded with better equipment to serve AI needs, or a new lab with modern high-end equipment can be established through the DeCAIR project.</p>		

Table 1.5.1 Assessment of Existing Labs

Partner Name	JUST	
Targeted Program(s)	Master of Science in Mechanical Engineering - Mechatronics	
Existing Labs Supporting AI and Data Science		Priority to Upgrade (High, Medium, Low)
<i>Mechatronics Lab</i>	<ol style="list-style-type: none"> 1) <i>Fuzzy Logic Kit</i> 2) <i>DC motor Control kit by Quaner</i> 3) <i>Rotary Inverted Pendulum kit by Qanser</i> 4) <i>Twin Rotor Helicopter by Feedback</i> 	<i>High</i>
Existing Labs Supporting Robotics		Priority to Upgrade (High, Medium, Low)
<i>Mechatronics Lab</i>	<ol style="list-style-type: none"> 1) <i>Twin Rotor Helicopter by Feedback</i> 2) <i>Electro-pneumatic and Electro-hydraulic kits by FESTO</i> 3) <i>Embedded systems kits by Sparkfun</i> 	<i>Low</i>
<i>Robotics and Intelligent systems</i>	<ol style="list-style-type: none"> 1) <i>Motion tracking system from VICON</i> 2) <i>Industrial Serial Manipulator from KUKA</i> 3) <i>Quadrotor</i> 	<i>High</i>
Other Existing Labs Supporting AIR		Priority to Upgrade (High, Medium, Low)
<i>Lab Name 1</i>	<i>List of major equipment</i>	
<i>Lab Name 2</i>	<i>List of major equipment</i>	
Summary and Notes		

Table 1.5.1 Assessment of Existing Labs

Partner Name	Tafila Technical University	
Targeted Program(s)		
Existing Labs Supporting AI and Data Science		Priority to Upgrade (High, Medium, Low)
<i>N/A</i>	<i>N/A</i>	High
<i>N/A</i>	<i>N/A</i>	High
Existing Labs Supporting Robotics		Priority to Upgrade (High, Medium, Low)
<i>N/A</i>	<i>N/A</i>	High
<i>N/A</i>	<i>N/A</i>	High
Other Existing Labs Supporting AIR		Priority to Upgrade (High, Medium, Low)
<i>N/A</i>	<i>N/A</i>	High
<i>N/A</i>	<i>N/A</i>	High
Summary and Notes		

Table 1.5.1 Assessment of Existing Labs

Partner Name	Lebanese University	
Targeted Program(s)	Master in Robotics and Intelligent Systems Mechanical Engineering Electrical Engineering	
Existing Labs Supporting AI and Data Science		Priority to Upgrade (High, Medium, Low)
<i>Computer Lab</i>	<i>Computers</i>	Low
<i>Signal Processing Lab</i>	<i>Data Acquisition System</i>	Low
Existing Labs Supporting Robotics		Priority to Upgrade (High, Medium, Low)
<i>Lab Name IFlying Robots lab</i>	<i>Flying Robots (Drones): Quadrotors, Hexarotors and Octorotors</i>	Medium
<i>Robotic Lab</i>	<i>Robotic serial arm</i>	High
Other Existing Labs Supporting AIR		Priority to Upgrade (High, Medium, Low)
<i>Control Lab</i>	<i>Control system</i>	Low
<i>Signal Processing Lab</i>	<i>Acquisition system</i>	Low
<i>Signal Processing Lab</i>	<i>Computer Vision</i>	Medium
Summary and Notes		

Table 1.5.1 Assessment of Existing Labs

Partner Name	Beirut Arab University	
Targeted Program(s)	Computer Engineering	
Existing Labs Supporting AI and Data Science		Priority to Upgrade (High, Medium, Low)
<i>Digital Systems Laboratory (DSL)</i>	Computers (8 units), advanced 8086 microprocessor trainer (5 units), digital input/output module (6 units), matrix led module (8 units), seven segment module (8 units), matrix key pad module (7 units), programmable interrupt controller module (8 units), LCD display module (8 units), stepper motor module (5 units), 8 channel 8 bit ADC module (6 units), digital/analog module (8 units), DC motor controller module (4 units), traffic light module (8 units), elevator module (6 units), DSP starter kit (5 units), ezdsp kit (1 unit), PIC programmer USB (6 units), picstart plus (3 units), flash starter kit (5 units), Digilent Spartan 3E-starter (1 unit), Telemasse (8 units), IC tester (2 units), digital logic lab – main board (6 units), basic gate experiment module (6 units), combinational logic circuit experiment module (30 units), clock generator circuit experiment module (6 units), sequence logic circuit experiment module (12 units), memory circuit experiment module (12 units), converter circuit experiment module (12 units)	High
<i>Software Laboratory (SWL)</i>	Computers (including desktops, screens, keyboards and mouse) (30 units), VGA splitter (1 unit), projector (1 unit), Network switches (2 units), rack (1 unit) Software (Windows 8.1, Microsoft Office 2013, Microsoft Visual Studio 2010, Cisco Packet Tracer 7.0, Arena 13.9); Visual Studio; MATLAB; LabVIEW; Quartus Prime	High
Existing Labs Supporting Robotics		Priority to Upgrade (High, Medium, Low)
<i>Digital Systems Laboratory (DSL)</i>	<i>Same as above</i>	High
<i>Software Laboratory (SWL)</i>	<i>Same as above</i>	High
<i>Control and Industrial Electronics Laboratory (CIEL)</i>	DC motor trainer (1 unit), AC position control (1 unit), DC position control (1 unit), DC motor speed control system (1 unit), inverter (1 unit), liquid level and temperature control level (1 unit), automation board (3 units)	High

Partner Name	Beirut Arab University	
Other Existing Labs Supporting AIR		Priority to Upgrade (High, Medium, Low)
<i>Communications Laboratory (COML)</i>	Spectrum analyzer (1 unit), network analyzer (1 unit), power meter E4418A (1 unit), power meter NRP2 (1 unit), computer (9 units), Dc power supply (6 units), propagation setup (1 unit), acoustic measurement impedance (1 unit), oscilloscope (6 units), bench for analog and digital kit (1 unit), frequency generator (2 units), waveform generator (6 units), current generator (1 unit), digital oscilloscope (3 units)	<i>High</i>
<i>Measurement and Electronics Laboratory (MEL)</i>	Oscilloscope (16 units), power supply (16 units), A-V meter DC & AC (2 units), frequency generator (17 units)	<i>High</i>
Summary and Notes		

Preliminary List of Needed Equipment to Order through DeCAIR Project

Table 1.5.2 Preliminary List of Equipment to Order through DeCAIR Project

Partner Name	University of Jordan		
Targeted Program(s)	B.Sc. in Computer Engineering (Existing) B.Sc. in Mechatronics Engineering (Existing) M.Sc. in Computer Engineering and Networks (Existing) M.Sc. in AI and Robotics (to be established)		
Item	Quantity	Estimated Cost (Euros)	
High-end workstations (many cores and dedicated GPUs)	2	23000	
High-spec PCs with dedicated GPUs	10	10000	
Laptops for teaching purposes	8	8000	
Smartboards for classrooms	4	4000	
Robotic manipulator	1	16000	
Autonomous ground robot	1	11000	
Autonomous air vehicle	1	17000	
Ground control station	1	6000	
		Total	95,000

Table 1.5.2 Preliminary List of Equipment to Order through DeCAIR Project

Partner Name	JUST		
Targeted Program(s)	Master of Science in Mechanical Engineering - Mechatronics		
	Item	Quantity	Estimated Cost (Euros)
	Laptops for teaching purposes	4	5000
	Smartboards for classrooms	1	1000
	BALL BALANCING TABLE 2-DoF Control Platform for Teaching and Research	1	6000
	LINEAR INVERTED PENDULUM 2-DoF Control Platform for Advanced Control Teaching and Research	1	6000
	BALL AND BEAM 1 DOF Control Platform for Teaching and Research	1	6000
	DELTA ROBOT 3-DoF Vision Guided Robotic Platform for Teaching and Research	1	6000
	STEWART PLATFORM 6-DoF sophisticated motion system for robotics and controls	1	6000
	1-DOF COPTER Flight simulation control unit for teaching and research	1	6000
	High-Performance Autonomous Ground Robot for Indoor Labs	1	6000
	QUANSER MECHATRONIC SYSTEMS BOARD with ELVIS III	1	6000
		Total	54,000

Table 1.5.2 Preliminary List of Equipment to Order through DeCAIR Project

Partner Name	Tafila Technical University		
Targeted Program(s)	Intelligent Systems Engineering Computer Engineernig		
	Item	Quantity	Estimated Cost (Euros)
	A GPU Server with an Intel Dual CPU Xenon Processor (Silver or Gold), 512 GB DDR4-RAM, 4 TB SSD hard disc and 4 to 8 free slots for GPU accelerator cards. Initially two slots can be occupied with a GeForce RTX 2080 Ti, similar to the workstations or with one or two business GPU cards such as a Nvidia Tesla V100S (16 GB). The new Nvidia A100 Tensor Core graphics processor also offers a powerful alternative. The remaining free slots are left for future expansion. The server is not placed in the laboratory, but centrally in the data center of the university. The server can be used on top of the AI workstations, if dedicated computing power is required.	1	15000
	AI WORKSTATIONS , CPU Intel Core i9-9900KF, 8 x 3.6 GHz RAM DDR-4, 2 x 16 GB , SSD 1 500 GB, GPU GB GeForce RTX 2080 Ti, 11 GB (lab workstations)	15	15000
	Jetson Nano Developer Kit	10	1000
	NVIDIA Jetson Xavier NX Developer Kit	10	4000
	NVIDIA Jetson AGX Xavier devekopment kit	10	6000
	Raspberry Pi CSI Camera	10	400
	JetBot AI robot platform	10	1000
	Google Coral Dev Board	10	3000
	6-axis Industrial robot arm (6-digree of freedom)	4	12000
	Humanoid Robot	3	7000
	unmanned Aerial Vehicle (UAV),	6	3000
	unmanned Ground vehicle (UGV)	4	5000
	Legos and constructible robots	4	3000
	Robot simulation software	1	1000
	Total price		
		Total	76400

Table 1.5.2 Preliminary List of Equipment to Order through DeCAIR Project

Partner Name	Lebanese University		
Targeted Program(s)	Master in Robotics and Intelligent System- Electrical Engineering- Mechanical Engineering		
	Item	Quantity	Estimated Cost (Euros)
	PIXKIT - Autonomous Driving Development Kit:	1	23.000
	Ainstein Automotive Safety Radar T-79	1	3500
	High-resolution lidar sensors	1	3500
	3D Scanning Bundle	1	500
	Industrial-level Blue Light 3D Scanner	1	1000
	ViperX 300 Robot Arm 6DOF	1	5000
		Total	36,500

Table 1.5.2 Preliminary List of Equipment to Order through DeCAIR Project

Partner Name	Beirut Arab University	
Targeted Program(s)	Computer Engineering	
Item	Quantity	Estimated Cost (Euros)
High-Performance Computing Systems	1	5000
FPGA Training Boards	12	5000
High-Performance FPGA Board	1	8000
GPUs	2	3000
Raspberry Pi Kits and Accessories	12	5000
Automation and Robotics Laboratory Kits	12	8000
Software Laboratory (MATLAB Toolboxes)	99 Users – Academic License	2000
	Total	36000 Euros

Facilities and Labs in Universities of Program Countries

Table 1.5.3 Detailed List for Labs Equipment in Universities of Program Countries

Partner Name	University of Pisa		
Partner Main Expertise	<input type="checkbox"/> AI	<input type="checkbox"/> Data Science	<input type="checkbox"/> Robotics
Labs Supporting AI and Data Science			
<i>Lab Name 1</i>	<i>List of major equipment</i>		
<i>Lab Name 2</i>	<i>List of major equipment</i>		
Labs Supporting Robotics			
<i>UNIPI AERIAL ROBOTICS LAB</i>	<i>Quadcopter Tarot frame for general purpose autonomous mission research</i> <i>Hexacopter Flame Wheel frame for general purpose autonomous mission research</i> <i>2 Quadcopter for indoor flight tests</i> <i>Camera Stabilizing gimbal prototype (1DOF)</i> <i>Camera Stabilizing gimbal (3DOF)</i> <i>fixed wing autonomous vehicle</i> <i>Crazyflie nano quadcopter</i> <i>Intel Ready-to-Fly Drone</i> <i>Dji Phantom 3 advanced Drone</i> <i>Ducted Fan Drone Prototype</i> <i>Vicon Motion Tracking System with 10 cameras</i>		
<i>UNIPI MANIPULATION LAB</i>	<i>2 Kuka Light Weight Robot LWR-II, robotic arms</i> <i>3 Franka Panda Emika, robotic arms</i> <i>1 UR10, Universal Robot, robotic arm</i> <i>6 Pisa/IIT soft hand</i> <i>1 DLR II Hand,</i> <i>10 ATI-nano 17, 6-axis force sensors, ATI Industries</i> <i>10 Electronic boards for controlling DC motors and signal acquisition</i> <i>a dual-arm robot on a two-wheeled mobile base provided with a stereo-camera to be used as a tele-operated platform to perform lab tests</i> <i>BIOPAC MP35 general Purpose</i>		

Partner Name	University of Pisa
	<i>2 Virtual Reality sets Oculus Rift</i>
<i>UNIPI MOBILE ROBOTICS LAB</i>	<i>6 Autonomous remotely controlled 1:8 scale model car 6 small mobile robots with arduino Autonomous Forklift, Toyota Robotnik STEEL XL, mobile robot Zeno, underwater autonomous vehicle</i>
Labs Supporting AIR	
<i>Lab Name 1</i>	<i>List of major equipment</i>
<i>Lab Name 2</i>	<i>List of major equipment</i>
Summary and Notes	

Table 1.5.3 Detailed List for Labs Equipment in Universities of Program Countries

Partner Name	University of Stuttgart – Institute of Engineering and Computational Mechanics		
Partner Main Expertise	<input checked="" type="checkbox"/> AI	<input type="checkbox"/> Data Science	<input checked="" type="checkbox"/> Robotics
Labs Supporting AI and Data Science			
<i>Lab – ITM</i>	<i>optical tracking system, multiple wheeled mobile robots, unmanned aerial vehicles, ...</i>		
Labs Supporting Robotics			
<i>Lab – ITM</i>	<i>multiple wheeled mobile robots, unmanned aerial vehicles, articulated robot, flexible one-arm-robot, driving simulator with active motion platform, micro-mechanical oscillation inducer, (large) Expo-pendulum, active vibration absorber, model railway, optical lenses, spring-damper combination on a hydraulic test bench, balanced ball on rim, machine foundation test bed, laser cutter, soldering stations, laservibrometer, 3D printer</i>		
<i>Metal workshop - ITM</i>	<i>turning machines (4x), milling machines (2x), drilling machines (2x), band saw, circular metal saw, trimming saw, metal band saw, belt and disc sander</i>		
Labs Supporting AIR			
	<i>See above</i>		
Summary and Notes			
<p>Our laboratory at the Institute of Engineering and Computational Mechanics at the University of Stuttgart (Germany) offers a variety of different devices and test benches as well as excellent measuring instruments. Many of the robotic tests were designed in-house and the required parts were manufactured in our metal workshop by trained employees. This includes, for example, mobile robots or aerial vehicles. The excellent setup is complemented by high-quality external components such as a visual tracking system, a single-arm robot and much more. Further details can also be found online on our website, see https://www.itm.uni-stuttgart.de/en/institute/laboratory/ and https://www.itm.uni-stuttgart.de/en/institute/metalworkshop/.</p>			

Table 1.5.3 Detailed List for Labs Equipment in Universities of Program Countries

Partner Name	University of Granada		
Partner Main Expertise	<input checked="" type="checkbox"/> AI	<input checked="" type="checkbox"/> Data Science	<input checked="" type="checkbox"/> Robotics
Labs Supporting AI and Data Science			
<i>Computing for AI and DS</i>	<p>A cluster of six HPC multi-GPU multi-CPU nodes:</p> <ul style="list-style-type: none"> • Titán (2 x procesador Intel® Xeon® E5-2630 v4, 4 x Nvidia Geforce GTX Titan X Pascal core GP102) • Atenea (2 x procesador Intel® Xeon® E5-2630 v4, 4 x Nvidia Geforce GTX Titan Xp core GP102.) • Zeus (2 x procesador Intel® Xeon® E5-2630 v4 @2.20GHz, 4 x Nvidia Geforce RTX 2080 Ti) • Hera (2 x procesador Intel® Xeon® Silver 4114 @ 2.20GHz, 4 x Nvidia Geforce RTX Titan RTX 24GB GDDR6) • NVIDIA DGX1 (Dual 20-Core Intel Xeon E5-2698 v4 2.2 GHz, 8x NVIDIA Tesla V100 32GB) • NVIDIA DGX1 (Dual 20-Core Intel Xeon E5-2698 v4 2.2 GHz, 8x NVIDIA Tesla V100 32GB) • Access to supercomputers, MareNostrum (BSC) and Picasso (University of Málaga) 		
Labs Supporting Robotics			
<i>Robotics</i>	<p>4 drones with a cage for flight tests.</p> <ul style="list-style-type: none"> • Ryze Tello y Parrot Mambo • Parrot Disco (fixed wing) • DJI Mavic Pro • Hexacopters for assembly (pieces: autopilot Pixhawk, motors, propellers, batteries, etc.) <p>4 educational robots, 2*Scorbot ER 4u and 2*ER V+</p> <p>18 educational mobile robots: 1*DonkeyCar with HQ camera, 1*Koala with laser, 6*Kephera II/III with US, 10*Zumo Robot</p> <p>3*Pixy for robot vision</p>		
<i>Hardware and printed circuits</i>	<ul style="list-style-type: none"> • Circuit board plotters: LPKF ProtoMat S103 • ABS plastic 3D printing center: Stratsys Dimension Elite. 		

Partner Name	University of Granada
	<ul style="list-style-type: none"> • Electroplating machine for via plating on multilayer PCBs: LPKF model MiniContac RS (220x330 mm PCBs). • LPKF solder mask exposure and solder mask exposure machine. • JCB AR5800 hot air soldering/desoldering station. • Semi-automatic assembly machine for SMD components: • Pick&Place model LPKF-ProtoPlace (components with footprint up to sizes 0201). • Ultrasonic cleaning station: Kerry Guyson (4-liter tank). • Oscilloscope: Rigol DS6062, 2 channels 600Mhz, 5GSa/s. • Signal generator: Rigol DG5071. 70Mhz, 1GSa/s
Labs Supporting AIR	
<i>Lab Name 1</i>	<i>List of major equipment</i>
<i>Lab Name 2</i>	<i>List of major equipment</i>
Summary and Notes	

Table 1.5.3 Detailed List for Labs Equipment in Universities of Program Countries

Partner Name	University of Genoa (UNIGE)		
Partner Main Expertise	<input checked="" type="checkbox"/> AI	<input checked="" type="checkbox"/> Data Science	<input type="checkbox"/> Robotics
Labs Supporting AI and Data Science			
DIBRIS-Software 1 and Software 2	32+24 PC workstations for training at all levels (BSc and MSc) in software, data science and computing (including HPC) subjects		
DIBRIS research facilities	Training of students at the master’s level are mostly done in research laboratories where they are involved in research projects and have access to the specific project’s equipment.		
Licenses for relevant software tools and platforms	Mathworks Matlab “Total Academic Headcount” Microsoft Office 365 Microsoft Education (includes licenses for operating systems, programming platforms and tools, Machine Learning Server, and other software)		
Labs Supporting Robotics			
<i>Lab Name 1</i>	<i>List of major equipment</i>		
<i>Lab Name 2</i>	<i>List of major equipment</i>		
Labs Supporting AIR			
<i>Lab Name 1</i>	<i>List of major equipment</i>		
<i>Lab Name 2</i>	<i>List of major equipment</i>		
Summary and Notes			