



# ***Reneal International Education Outreach, Inc.***

***TRANSFORMING LIVES  
THROUGH TECHNOLOGY  
AND EDUCATION***

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[www.reneal.org](http://www.reneal.org)

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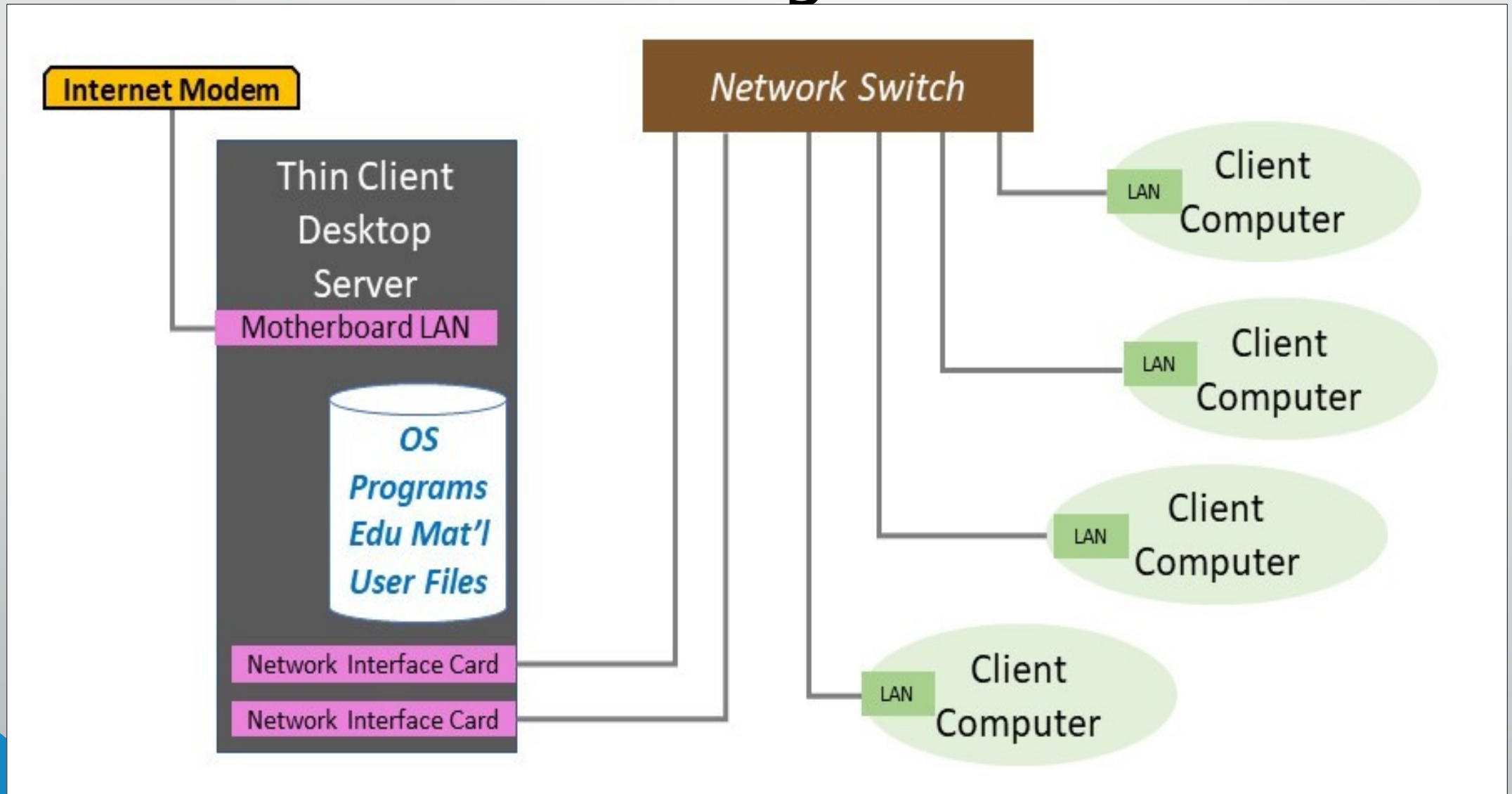
# Arusha Region-Reneal Partnership

- Goal: Installing computer labs in government secondary schools
- Key Design Features:
  - ✓ Ubuntu, Open Source Software
  - ✓ Extensive off-line educational content
  - ✓ User-friendly interface, system admin tools, built-in diagnostics, and seamless integration
  - ✓ Cost, maintainability, and reliability goals met through a client-server approach

# System Attributes

- Low-cost:
  - ✓ Free, legal Open Source software
  - ✓ Client-server architecture so older computers can be used
- Low-maintenance / High reliability:
  - ✓ No viruses
  - ✓ Centralized software, no local hard disk or software failures
  - ✓ Robust server design
- Tailored for schools:
  - ✓ Teacher/student accounts and file storage
  - ✓ Educational content specific for Tanzania schools

# Renear Client-Server Computer Lab Design



# Renear Client-Server Computer Lab Design

- User accounts for access control
  - ✓ System admin: for computer teachers for sysadmin tasks
  - ✓ Teacher: password-protected personal account and file storage
  - ✓ Student: personal folder plus access to shared student files
- Custom software
  - ✓ Server config, accounts management, internet management
- High-reliability server:
  - ✓ High-reliability components and hardware redundancy
- Server build software stored on a USB hard drive for easy sharing

# User Features

- Applications programs: office suite, photo editing, video editing, webpage design, desktop publishing, computer-aided design, programming, etc.
- Numerous educational programs, particularly for math and science
- Extensive off-line educational content (books, movies, offline Wikipedia, National Exam papers, Tanzania curriculum notes, science simulations, etc.)
- TeachersShared and AllUsersShared folders for permission-controlled content sharing

# User Features

- Epopetes classroom management tool for screen-sharing and monitoring student work
- Customized program for shared video streaming
- For schools with Internet connectivity, easy internet on/off control during class plus automatically-updated black list to block inappropriate websites



# Keys to Sustainability

- Partnership with the local government
  - ✓ Arusha Region supports Reneal with school selection, frequent communication with school heads and computer teachers, and on-going monitoring
  - ✓ Joint planning guides computer lab upgrades and responses to attrition and theft.
- Training:
  - ✓ Tutorial videos and slide decks for the computer teachers
  - ✓ Teacher Orientation is offered for all teachers
  - ✓ Reneal System Admin Manual provided to each school



# Keys to Sustainability

- Maintenance:
  - ✓ Automatic daily backups to a dedicated second disk
  - ✓ Virtual Private Network (VPN) for remote maintenance when Internet is available
  - ✓ Local trained technicians available for maintenance and training
- Troubleshooting:
  - ✓ Built-in diagnostic, troubleshooting, and repair program runs automatically each hour to detect and fix many issues
  - ✓ Built-in performance and usage data collection for monitoring

# Keys to Sustainability

- Expandability:
  - ✓ Software upgrades require a single operation on the server, then all new features immediately available on all clients
  - ✓ New educational content can be added easily to the server
  - ✓ New clients can easily be added to the system, by connecting them with UTP cable to the network switch

# Risks and Issues

- Finding time for Computer Studies and general student computer use in the daily timetable
- Time-sharing of lab between Computer Studies and computer-aided instruction (CAI) in other subject areas
- Untapped opportunity to use the computers to teach in other subject areas – teachers would benefit from training in CAI methodology
- Microsoft-centric focus of Computer Studies National Exam – although students may excel at computer use, they may do poorly in the National Exam practicals because of focus on Microsoft

# Risks and Issues

- Computer lab security – about a third of the schools have experienced equipment theft; continuous oversight is critical
- “Temporary” removal of items by teachers from the computer lab
- The Linux user interface has been customized to look like Microsoft Windows, but some teachers do not have the time or interest to learn a new system
- Schools sometimes fail to report computer lab problems and issues in a timely fashion
- Because Reneal relies on donations of used computers to serve as clients, expansion is both limited and unpredictable

# Reneal Computer Labs in Arusha Region

**2013**

† Mlangarini SS  
Mukulat SS

**2014**

Ilkiding'a SS  
Mwandet SS

**2015**

† Enyoito SS  
Ilboru SS  
Mringa SS  
Oldadai SS

**2017**

† Mateves SS  
Nduruma SS

**2018**

Kimnyaki SS  
Kiranyi SS  
Oldonyosambu SS  
Sokon II SS

**2019**

Olmotoni SS  
Osiligi SS  
Bangata SS  
Einoti SS  
Olokii SS  
Olturmet SS  
† Mlangarini A-Level  
† Mwandet A-Level

**2020**

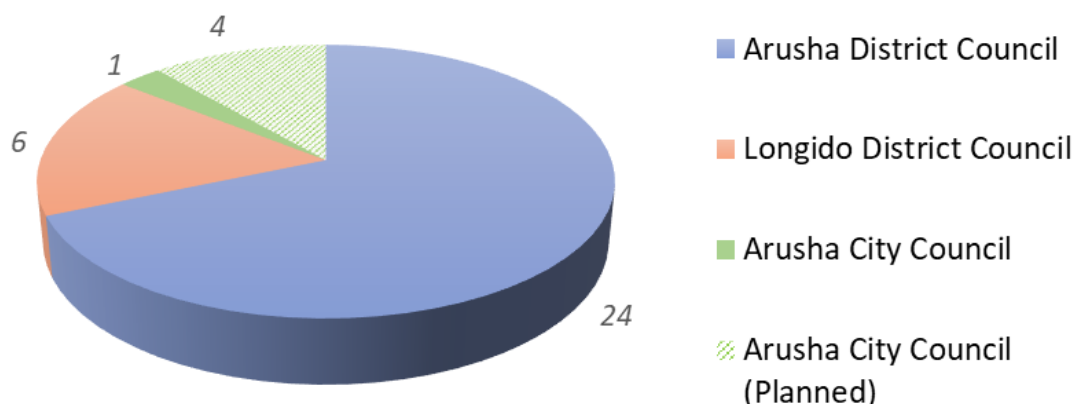
Ngiresi SS  
Sambasha SS  
Longido A-Level  
Namanga SS  
Ngarnaibor SS  
Enduimet SS  
Tingatinga SS  
Arusha Girls' SS

**2021**

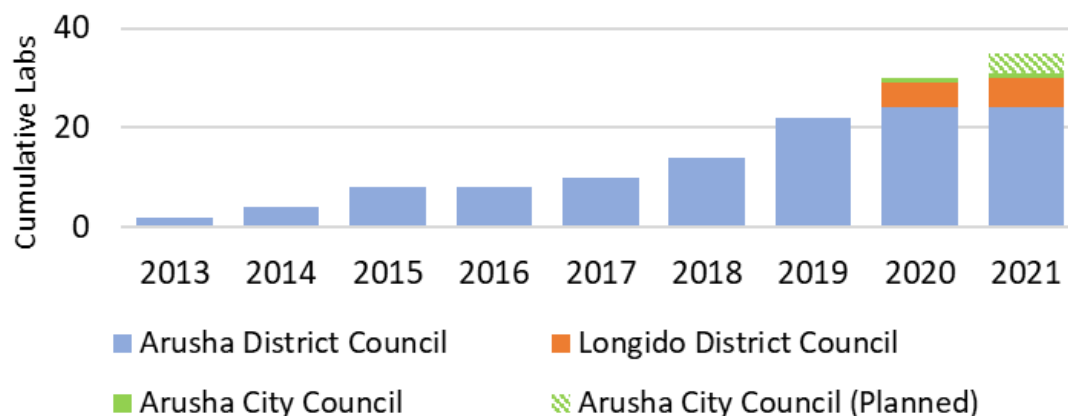
Longido SS  
\* † Mringa A-Level

**2019: Almost 45,000 hours of student use, 9,000 hours of teacher use**

Arusha Region Reneal Labs (2021)



Cumulative: Reneal Labs in Arusha Region



† MacBook Lab

\* Awaiting installation

# Form 2 National Exam Results

**2019**

	School	A	B	C	D	F	Examinees
1	Enyoito				4	17	21
2	Ilkiding'a				5	27	32
3	Mateves			10	14	3	27
4	Mlangarini			8	19	22	49
5	Mringa		3	5	11	5	24
6	Mukulat				6	19	25
7	Mwandet			8	21	14	43
8	Nduruma				6	10	16
9	Olmotonyi			2	15	9	26
10	Osiligi			3	15	13	31
	<b>Totals</b>		<b>3</b>	<b>36</b>	<b>116</b>	<b>139</b>	<b>294</b>

**2020**

	School	A	B	C	D	F	Examinees
1	Engarenibor				11	3	14
2	Enyoito				5	6	11
3	Ilkiding'a				2	23	25
4	Mateves			3	16	15	34
5	Mlangarini			5	17	15	37
6	Mringa			8	8	7	23
7	Mwandet			3	6	14	23
8	Nduruma					5	5
9	Olmotonyi			1	5	15	21
10	Osiligi			1	5	5	11
	<b>Totals</b>			<b>21</b>	<b>75</b>	<b>108</b>	<b>204</b>

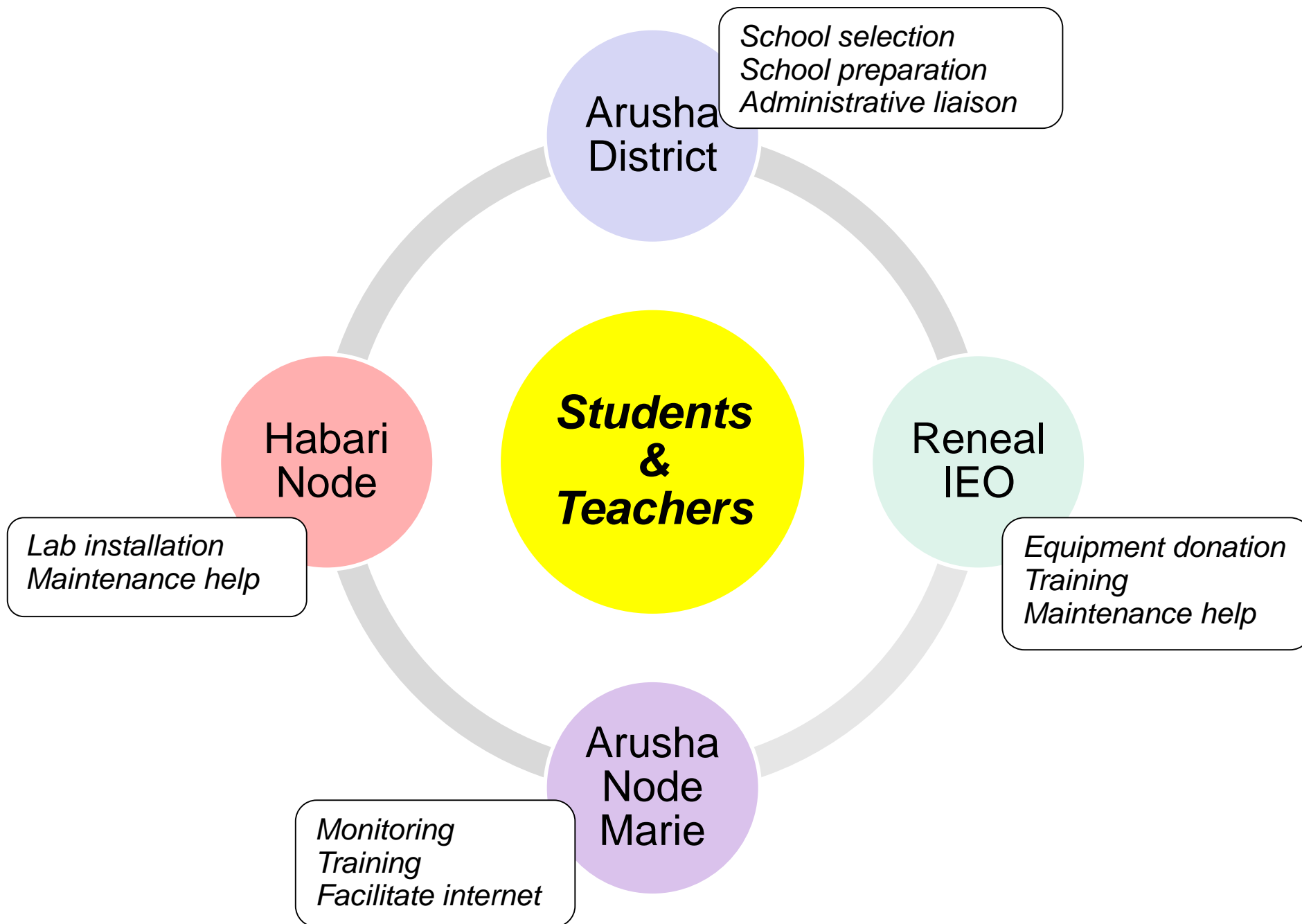
# Form 4 National Exam Results

**2020**

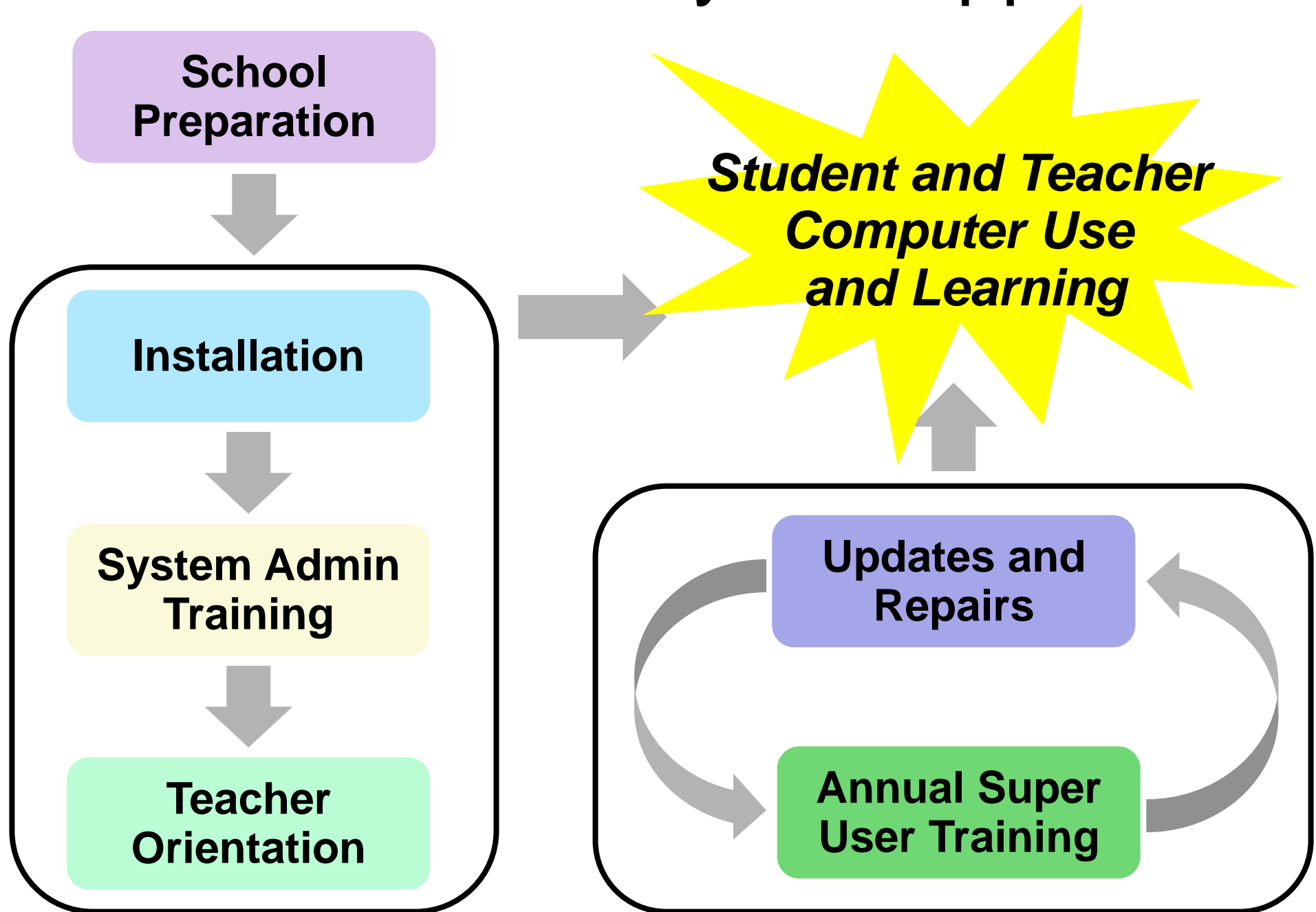
	School	A	B	C	D	F	Examinees
1	Mlangarini		1	3	4	8	16
2	Mwandet		1	2	2		5
	<b>Totals</b>		<b>2</b>	<b>5</b>	<b>6</b>	<b>8</b>	<b>21</b>



# 2014 Collaboration Agreement



# Renewal Life Cycle Support



# School Preparation

## What Reneal provides

- Powerful server computer
- Gigabit network switch
- Up to 20 used computers
  - ✓ Laptop, adapter, and mouse
- Network cable/connectors
- UPS and voltage stabilizer
- Power extensions
- Shipping costs
- Training and orientation
- On-going support

## What School provides

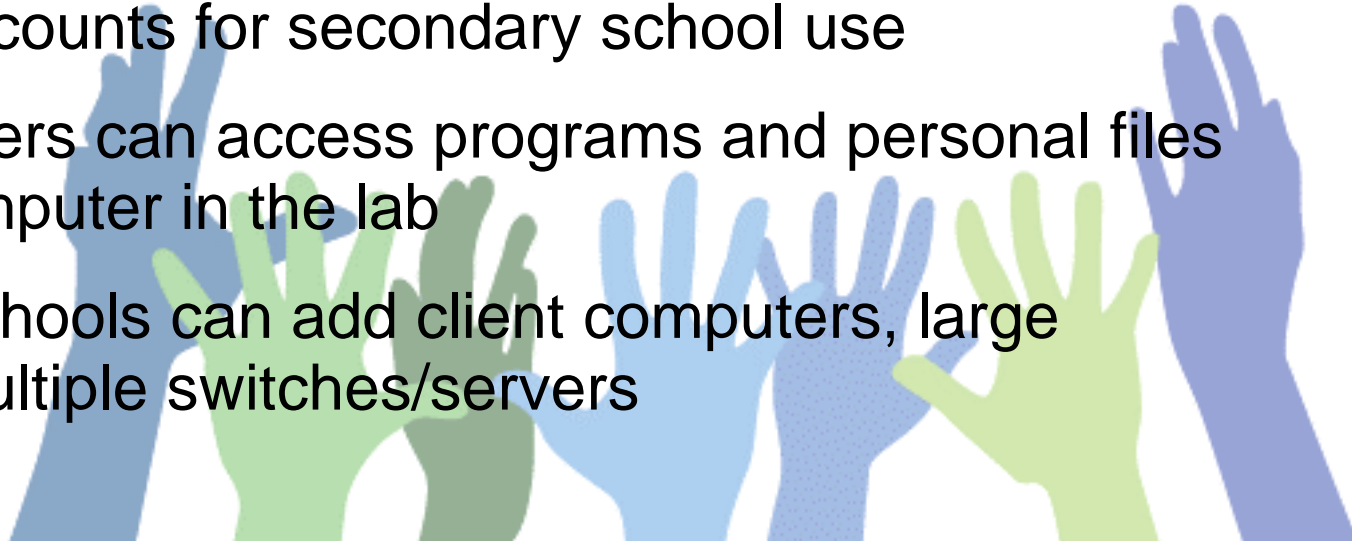
- Classroom for lab
- Computer teacher(s)
- Security (window grills, heavy door, locks)
- Tables for computers
- Chairs for students
- Electricity outlet(s)
- ***Commitment to use and care for the system***

Purchased in Arusha



# Advantages of Reneal System

- Minimal maintenance:
  - ✓ All software and files are on the server, no costly and time consuming client upgrades
  - ✓ Free, legal software with **no virus hassles**
  - ✓ Improved reliability since clients don't need a hard disk or local software
  - ✓ Built-in diagnostic and repair program, automated backups
- Low cost: client computers can be older model laptops
- Tailored environment: educational resources and teacher/student accounts for secondary school use
- Central access: users can access programs and personal files from any client computer in the lab
- Easy scalability: schools can add client computers, large schools can run multiple switches/servers



# Renear Server Content

## Computer applications:

- Word processor, spreadsheet, presentation
- Photo/video/audio editing, page layout
- Webpage development, programming

## Off-line educational content:

- Wikipedia
- Tanzania National exams
- Tanzania curriculum notes
- Science and math simulations
- Khan educational videos (English and Kiswahili)
- Textbooks and literature
- Computer tutorials
- Typing training
- Many others...



# Challenges

- School timetable very tight, difficult to schedule computer time
- Computer-to-student ratio is still very small
- Computer Studies curriculum focused on theory and Microsoft, Computer Studies National Exam focused on Microsoft knowledge, not on basic concepts
- Computer usage in other subject areas still very limited
- Equipment theft – schools required to replace stolen items, but it takes a lot of management oversight



# Additional Needs

- Ministry to help allocate ICT teachers to beneficiary schools
- Connecting Reneal labs to computer-aided-instruction experts
- Identify other NGOs or governments that can assist with obtaining client computers (new or used)
- Consider Computer Studies curriculum and National Exam content – what best leverages the lab resources plus prepares students?
- Printer and photocopier, video projector for schools
- Free internet
- Assist financially with locally-obtained equipment (Cat6 network cable, UPS, etc.)
- Assist with VAT and customs duty waivers





# Acknowledgments

- *Reneal is very grateful to the Arusha Regional Office, Arusha District Council, Arusha City Council, Longido District Council, and Handeni District Council for their support of Reneal's projects*
- *Reneal also thanks partners Habari Node and Arusha Node Marie who provide pro bono technical assistance during lab installation*
- *In 2021, Apto Solutions, an IT Asset Disposition Services company based in Atlanta, Georgia, USA has graciously supported Reneal with used computers and related peripherals*