Definitional Mission to Evaluate ICT Projects in Brazil: Volume 4: Banpará
(Volumes 1, 2, 3 & 5 Issued Separately)

Final Report

Submitted by
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The U.S. Trade and Development Agency helps companies create U.S. jobs through the export of U.S. goods and services for priority development projects in emerging economies. USTDA links U.S. businesses to export opportunities by funding project planning activities, pilot projects, and reverse trade missions while creating sustainable infrastructure and economic growth in partner countries

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Banpará Digital Transformation
Definitional Mission Report

A. Executive Summary

Grantee: Banpará

Activity Budget: $ 617,670

> **U.S. Export Potential:** Hardware, software, training and equipment to support Banpara's digital transformation total approximately US$46.1 million.

Banpará seeks technical assistance for an international consultancy financed by USTDA to develop detailed plans to for the execution of two project components summarized below.

1. ***Digital transformation of Banpará's IT Architecture:*** define and implement a modern IT architecture capable of meeting the needs of the majority shareholder and clients, looking ahead and with solid and scalable technological capacity, prepared for exponential growth.
2. ***Modernization of the Banpará data center and design of a new backup data center:*** Banpará's data center and its backup are becoming obsolete and the backup data center lacks adequate security. As part of the Banpará's digital transformation, the existing data center would be progressively modernized, and a new backup data center constructed.

Banpará's mission is generating value for the State of Pará, as a self-sustaining bank that promotes economic and social development.

Summaries of all meetings held and contact details for participants are included as Annexes III and IV to this Final Report. This Final Report contains a summary of the DM process and findings. The DM Contractor's recommendations and consulting team qualifications are presented here.

II. Project Description

A. Introduction

Brazil

Brazil is a recognized leader in ICT and in eGovernment in Latin America and among major emerging market economies worldwide. In keeping with Brazil's strong federal system, not only the national government but all state governments and a growing number of municipal governments have expanding eGovernment and ICT programs, of increasing sophistication. Ever more powerful, flexible and economical, ICT presents formidable new opportunities to accelerate social and economic development. But realizing this potential requires an enabling environment: appropriate incentives, policies and programs structured by governments that can also catalyze private investment. Brazil's national, state, and municipal governments recognize that a strong effort to bridge the digital divide is necessary in a country known for its high degree of income inequality.

In 2018 Brazil had 123 million Internet users, fourth largest in the world after China, India, and the United States. According to the annual survey conducted by the Brazilian Internet Steering Committee (CGI.br), in 2017 61% of Brazilian private homes had an Internet connection, up from 15% in 2006. Over the same period the percentage of individuals above 10 years of age who accessed the Internet in the three months prior to the annual survey conducted by CGI.br rose from 28 to 67. So, despite the undeniable progress, there is still a long way to go to achieve true digital inclusion. As of January 2019, the number of fixed broadband subscribers had reached only 31.2 million, or 12.4 per 100 inhabitants. Of these connections, 84% were over 2 Mbps and only 28% greater than 34 Mbps. But mobile broadband subscriptions had exploded to 182 million, of which 71% were 4G (LTE). While 3G and 4G mobile connections are useful, smart phones are less than ideal for many applications, especially e-learning, e-health, and eGovernment.

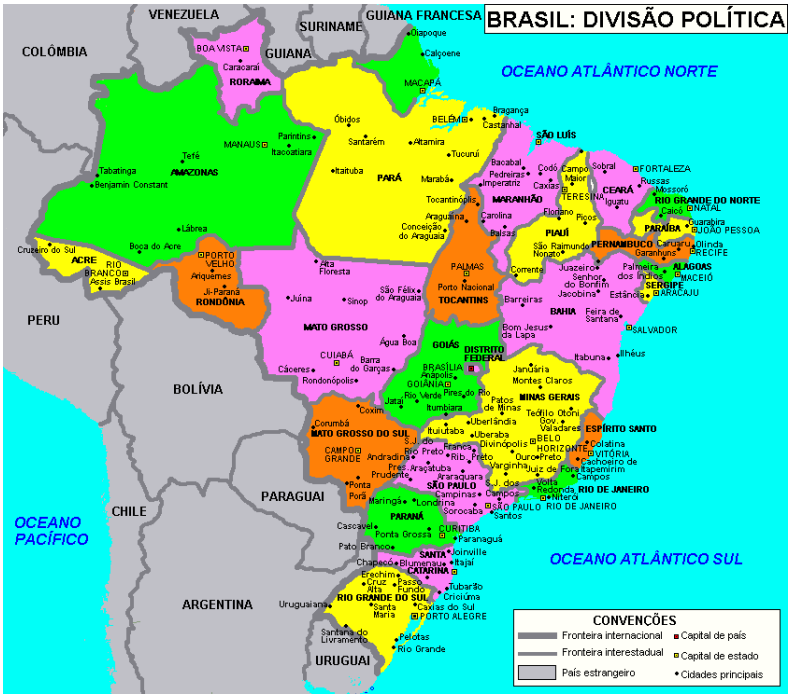
Nationwide averages for Internet penetration conceal wide differences in access, being higher for urban than rural areas, richer people, more educated people, and more developed states.

Brazil is the largest and arguably the most important country in Latin America (Figure 1). With an estimated population of 209 million in July 2018, it is also the most populous. In 2017 Brazil's economy was the ninth largest in the world according to the World Bank. Per capital income was US$9, 821 in 2017. The five largest cities are São Paulo, Rio de Janeiro, Brasília, Cuiabá, Fortaleza, and Belo Horizonte. There are 15 cities with over a million people, 40 cities of over 500,000 people, and 5,570 municipalities. With some 75 million people in the rural areas as defined by the Ministry of Agricultural Development, provision of affordable broadband to this group, which has the lowest average income levels, presents a particularly severe problem.

To help improve broadband coverage and reduce the cost of broadband access, the government launched a major broadband infrastructure development initiative, setting ambitious targets. Called the National Broadband Plan (*Plano Nacional de Banda Larga* – PNBL), the goal was to ensure that broadband access is available to low-income households, especially in areas that have so far been poorly served. But the federal government allocated only limited financial resources to the PNBL, and the telecommunications sector remains the most highly taxed in Brazil at some 43% of net income. Many States created strategic plans for broadband and eGovernment and are implementing the projects in these plans. Most state Governors understand that they need to modernize their government secretariats and agencies, and to support them with a modern information infrastructure

so they can become transparent and nimble, focused on producing excellent public services in essential areas, such as public safety, education, health, and welfare. These states are creating public and private partnerships to help achieve these goals.

Figure 1: Political Map of Brazil



Brazil has begun recovering from a deep recession and is committed to market-oriented economic reforms including social security, taxation, and bureaucracy reduction.

Despite receiving considerably less investment resources than announced on various occasions by government official (that can be considered a sign of less than urgent priority for the PNBL), Telebras, a federal telecom operator, has gradually created a national network of fiber optic cables, in large part through public-public and public-private partnerships that involve leasing or exchanging existing dark fiber. The growth of the Telebras network has increased competition and thereby led to lower prices offered by private providers. Expansion of high-speed connections has been spurred by growth in demand for Internet access by the emerging lower middle class.

For primary and secondary education, beginning in 2008 telecommunications operators were required to provide broadband connections at increasing speeds to all urban public schools. This was obtained at virtually no budgetary cost by the so-called "exchange of obligations" agreed in April 2008 whereby the operators were relieved of the requirement to provide thousands of outmoded Telecommunication Services Posts with public phone booths, fax machines and Internet-connected computers. By 2014 all 62, 925 urban public schools had free broadband connections, though the quality and speed of the connections still left much to be desired.

A growing number of states, such as Ceará, Pará and Rio Grande do Sul, have built their own terrestrial networks making use of various kinds of partnerships, usually with the National Education and Research Network (*Rede Nacional de Ensino e Pesquisa* – RNP), electric power distributors, and

companies such as Petrobras and Vale that own fiber networks of their own. There objectives have been to reduce costs of connectivity and reach previously underserved or unserved residents.

In 2005 RNP began a program to build fast metropolitan fiber optic networks in Brazil's major cities in association with a variety of partners. This program is called Redecomep, and as of June 2019 had 40 metropolitan networks in operation with some 2,000 km of fiber optic cables. Redecomep achieved this by partnering with electric power companies, state and municipal governments and other entities that provided rights or way, ducts or poles in return for access to fibers in these cables.

The Ministry of Science, Technology, Innovation and Communication (MCTI) finances fiber optic cables and equipment for operation of the fibers in these cables that serve academic and research institutions. But the number of pairs of fiber in these cables is much larger than needed for the academic and research institutions, allowing allocation to other partners that provide services in kind or for direct leasing payments. For example, metros, light rail lines, urban toll roads, and state and municipal governments can offer rights of way and ducts. Electric power companies can provide poles on which the cables can be hung. And Telebras can offer fibers in its backbone network.

In Ceará the state ICT Company, ETICE, has built a 3,000-kilometer ring of fiber optic cables around the state that, with its wireless extensions, reaches 88 percent of the state's population. Called the Digital Beltway (*Cinturão Digital do Ceará - CDC*), its nucleus is Gigafor, co-financed by RNP's Redecomep program in the state capital, Fortaleza. At various points along the fiber trunk lines there are towers from which municipalities not connected to CDC fiber can connect through wireless links, allowing them to communicate with the state government and other municipalities. In 2015 ETICE held a public auction of dark fibers in the CDC using a RFP designed with USTDA-funded technical assistance, a project on which Peter Knight worked. A consortium of Ceará-based ISPs won the right to a lot of fibers. The income from the lease of these fibers covers all of ETICE's operating costs, making the company independent of the state budget and contributing to the expansion of private sector ISPs in Ceará. There are plans to expand the CDC to reach more interior points in the state as part of contracts to be signed with future private sector partners to be selected in new auctions using the improved RFP design and through the RNP's *Veredas Novas* program.

A similar program called Navegpará exists in the state of Pará. H&A's 2016 Definitional Mission recommended that a feasibility study that would expand the Navcgapará network using both fiber and radio extensions be financed, and Astro Systems won the contract to carry out that study.

In Paraná the state government has used another means to build a state network, namely purchasing bandwidth from Copel Telecom, a subsidiary of the state electric power company. Copel Telecom has an extensive fiber optic network launched in 2010 that now reaches all 399 municipalities in the state. The network has over 30,000 km of fiber optic cables.

Rapid technological change and increased competition among providers of telecommunications services promoted by Brazil's successful privatization and liberalization of this sector have helped reduce the cost of connectivity, and many federal, state and municipal initiatives aim to provide free or low-cost wireless Internet service to low-income populations. Continued technological progress, the availability of free and open source software, and favorable financing terms have reduced the cost of computer equipment and software.

Brazil's new federal government is committed to macroeconomic stability and market-oriented reforms that should accelerate Brazil's growth despite the high tax burden that has made it difficult to increase public financial resources for ICT and eGovernment-related investments, including telecommunications and IT infrastructure, public digital inclusion programs, connectivity, distance

education, eGovernment programs, and the like. Furthermore, the new government seeks to improve relations with the United States.

B. Pará

Pará is Brazil's second largest state. The Equator and the Amazon River traverse it and it borders the Brazilian states of (clockwise from the north) Amapá, Maranhão, Tocantins, Mato Grosso, Amazonas, and Roraima. To the northwest it also borders Guyana and Suriname, and to the northeast it faces the Atlantic Ocean (Figures 1 and 2). The capital and largest city is Belém, the 11th most populous city in the country. The native vegetation is tropical rainforest typical of the Amazon basin. Annual precipitation is over 1500 mm (59 inches).

Pará is the most populous state of Brazil's northern region with an estimated population of 8.6 million in 2019, being the ninth most populous state in Brazil. It is the second largest state of Brazil in area, with 481.7 square miles. Pará produces rubber (extracted from natural rubber trees), tropical hardwoods, and minerals, notably iron ore and bauxite. Much of the mineral output comes from the Carajás mining area, in the Carajás mining district. The world's largest iron-ore mine (that also produces other minerals such as gold, copper, manganese and nickel) is located there and operated by Vale, a major Brazilian mining company, privatized in 1997. Electric power for mining operations comes from the Tucuruí dam, on the Tocantins River; Tucuruí was the first large-scale hydroelectric project in the Brazilian Amazon rainforest. Tucuruí supplies electric power to much of the state and neighboring states of Tocantins and Maranhão through a federal state power distribution company in the Eletrobras group, Eletronorte (ELN)

Figure 2: Map of Pará

Pará has 144 municipalities (*municípios*) – composed of a central city or town, known as the municipal seat, smaller towns, and an often-substantial rural area. Table 1 shows the 20 most populous municípios.

Table 1: Twenty Most Populous Municípios in Pará, 2018

Rank	Município	Pop.	Rank	Município	Pop.
1	Belém	1,485,732	11	São Félix do Xingu	124,806
2	Ananindeua	525,566	12	Barcarena	124,763
3	Santarém	302,667	13	Altamira	122,294
4	Marabá	275,086	14	Tucuruí	113,295
5	Castanhal	198,294	15	Paragominas	111,764
6	Paraupebas	202,282	16	Tailândia	103,664
7	Abaetetuba	158,292	17	Breves	101,891
8	Cameta	136,390	18	Itaituba	101,097
9	Marituba	129,321	19	Redenção	83,997
10	Bragança	126,436	20	Moju	80,988

Source: http://pt.wikipedia.org/wiki/Par%C3%A1, Original data from Brazilian Institute for Geography and Statistics (IBGE)

In December 2011 a plebiscite was held to determine whether the state should be split into three parts, creating two new states: Carajás and Tapajós (Figure 3). 66.6 and 66.1 percent of the population rejected the initiatives. Nevertheless the issue of whether to create two new states remains a live one.

Figure 3: Proposed Division of Pará into Three States

C: Banpará

Banpará is a self-sustaining Bank tasked with promoting Pará's economic and social development.

Throughout its existence, based on its mission as agent of the socioeconomic development of the State of Pará, Banpará has strived to offer quality products and services to customers, who are proving more and more demanding. For this reason, it invests in training its personnel as well as in cutting-edge technology, an essential element for competitiveness of any company of the financial sector.

Banpará's history

Although founded in 1959, it was not until 1961 that Banpará had its charter approved by the Superintendency of Currency and Credit - SUMOC, which at the time was the supervisory body of the banking sector.

On October 26, 1961, Banpará began its activities in a rented building, with only 17 employees. In July 1964, Banpará was transferred to its first headquarters, in the Dias Paes building, on Avenida Presidente Vargas, 275 in Belém. Then, on February 18, 1966, the first branch was inaugurated in the interior of Pará, in the city of Santarém. Outside of Pará, the Rio de Janeiro branch was the first to be inaugurated in 1967.

On December 12, 1979, the acronym of the bank was changed from BEP to Banpará to avoid confusion with the acronyms of other financial institutions. This change allowed a more immediate identification of the bank with the State of Pará.

Today, Banpará has 429 service points: 121 branch offices, 42 service stations, and 266 ATMs located throughout Pará.

Figure 4: Map of Banpará branches

Source: Banpará

Banpará Mission

To generate value for the State of Pará, as a self-sustaining Bank that acts for economic and social development.

Banpará Vision

To be recognized as the regional bank that generates the best economic and social results.

Banpará Values

- Profit as a measure of performance

- Innovation focused on results
- Transparency
- Meritocracy
- Social and Environmental Responsibility
- Commitment to the client

Banpará's Plans for Expansion

Banpará plans to inaugurate 31 new branches by the end of 2021, and by the end of this year 2019, five new branches will have been inaugurated, as shown below:

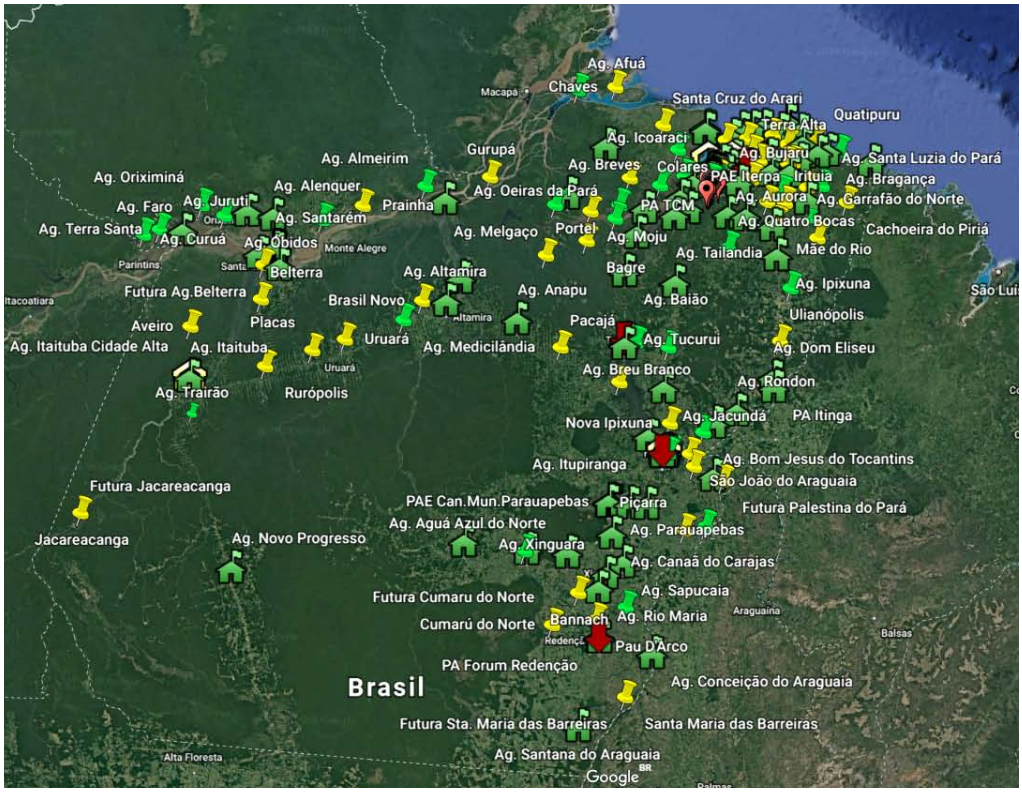
Table 2: Banpará's Expansion Plan, 2019-2022

Item	Municípios included in the Expansion Plan	2019	2020	2021	Forecast
1	Aveiro				
2	Bagre				
3	Bannach		1		
4	Belterra				
5	Brasil Novo				
6	Cachoeira do Piriá	1			nov/19
7	Chaves		1		
8	Colares			1	
9	Cumaru do Norte	1			sept/19
10	Gurupá		1		
11	Inahangapi			1	
12	Irituia			1	
13	Jacareacanga	1			oct/19
14	Mãe do Rio		1		
15	Magalhães Barata				
16	Nova Esperança do Piriá				
17	Nova Ipixuna			1	
18	Nova Timboteua			1	
19	Novo Repartimento		1		
20	Ourém			1	
21	Pacajá		1		
22	Pau D'Arco	1			
23	Peixe-Boi				
24	Piçarra		1		
25	Placas			1	
26	Portel		1		
27	Prainha		1		
28	Quatipuru				

29	Rurópolis	1			sept/19
30	Santa Cruz do Arari			1	
31	Santa Maria das Barreiras		1		
32	Santarém Novo			1	
33	São Domingos do Araguaia		1		
34	São Domingos do Capim				
35	São Francisco do Pará			1	
36	São João da Ponta			1	
37	São João do Araguaia			1	
38	São Sebastião da Boa Vista			1	
39	Terra Alta				
40	Ulianópolis		1		
41	Uruará		1		
	Totals	**5**	**13**	**13**	

Source: Banpará

Figure 5: Map of Banpará planned expansion (yellow pins)



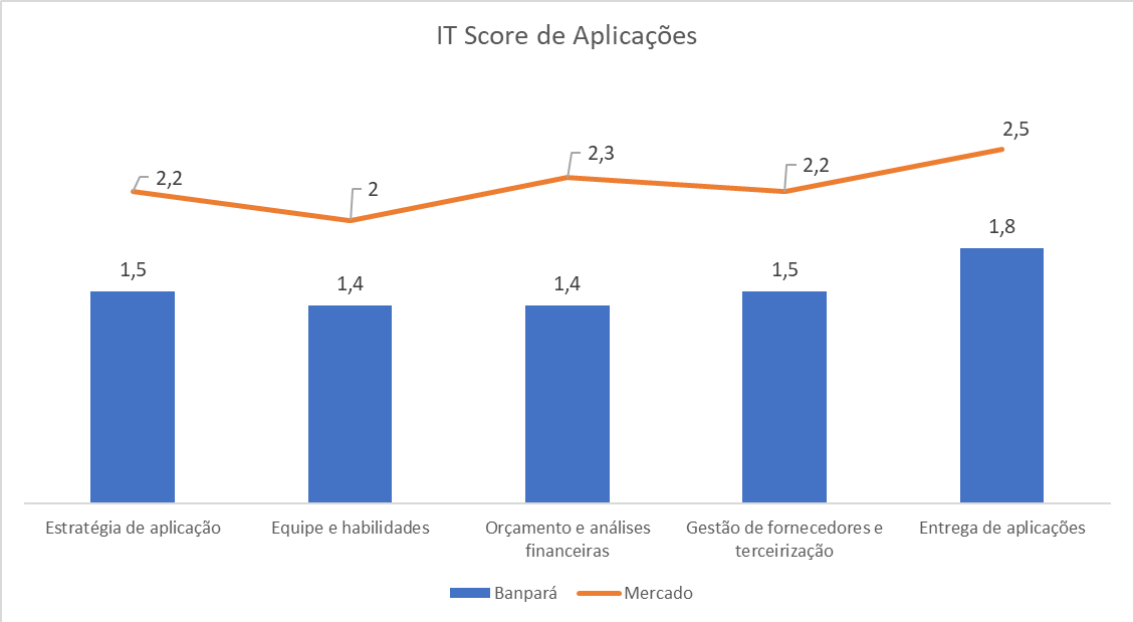
Source: Banpará

Banpará's outdated IT systems

Currently, Banpará has a heterogeneous and highly complex technological environment, making

integration between systems and interoperability difficult, not to mention the high financial cost for their upgrades. Additionally, Banpará does not have a formal reference architecture or applications strategy. As a result, new systems are implemented without the Bank's technological direction. Suppliers rather than Banpará define the technologies used.

Figure 6: Gartner Benchmarking of Banpará's IT Applications



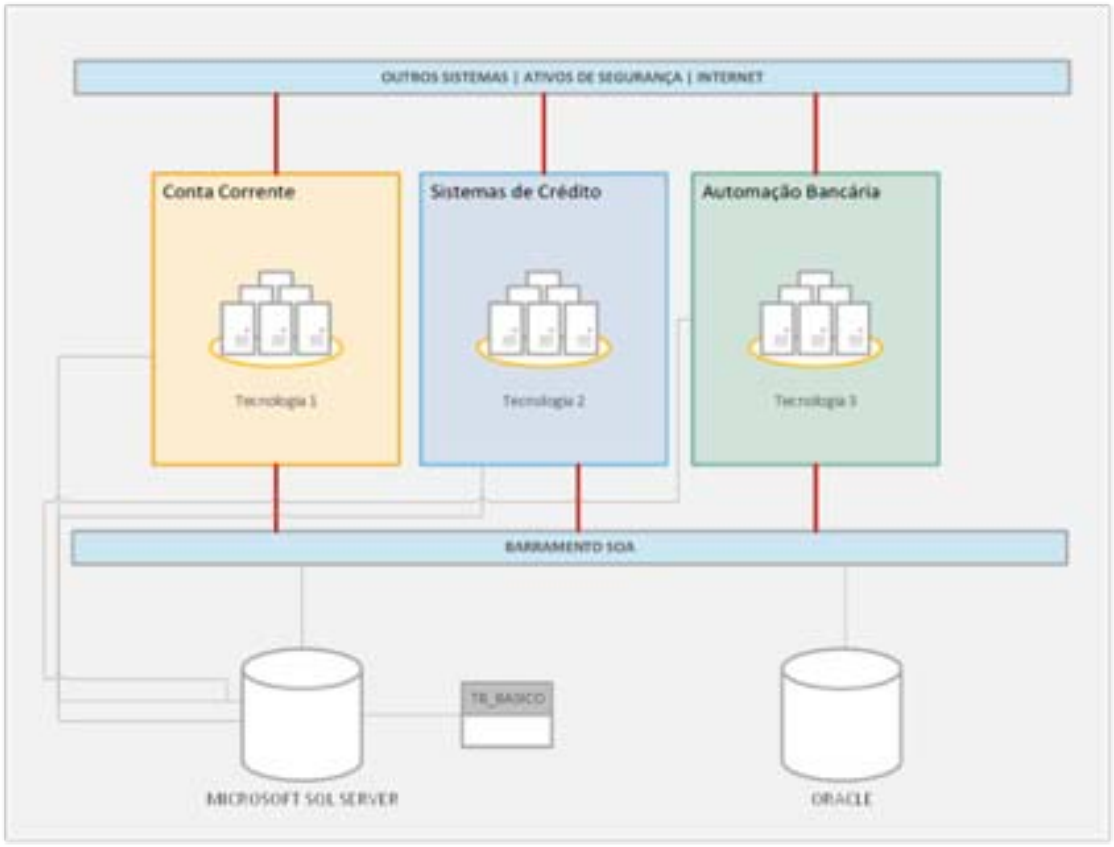
Source: Gartner analysis done in 2018

Federal government Decree No. 9,319 of March 21, 2018 established the National System for Digital Transformation and the governance structure for the implementation of the Brazilian Strategy for Digital Transformation (E-Digital). For eGovernment, the Strategy for Digital Governance (*Estratégia de Governança Digital – EGD Transforação Digital: Cidadania e Governo 2016-2019*) Revised Version May 2018[1] is the key document. Banpará's current digital transformation strategy[2] and tactical[3] planning documents were elaborated guided by these documents.

Banpará's current IT architecture employs different programming languages and technologies, several components are outdated, and there are no standardized integrations, making communication between systems difficult, overloading specific structures, thus sometimes making the services unavailable.

[1] https://www.governodigital.gov.br/documentos-e-arquivos/Estrategia-de-Governanca-Digital.pdf
[2] BANPARÁ (2018). *Plano Estratégico de TI (PETI), 2018-2021*. Brasília, March.
[3] BANPARÁ (2019). *Plano Diretor de TI (PDTI) 2018-2021*, versão 2.0. Brasília, January

Figure 7: Banpará's Current IT Architecture



Source: Banpará

There is also a need to define the modernization of the physical infrastructure that serves the primary and secondary Datacenters, considering that it is part of the strategy of having a scalable and profitable environment.

Banpará's Plans for Digital Transformation

Banpará proposes to define and implement a solid and scalable reference technology architecture that plays a strategic role in increasing the availability of Banpará's corporate systems, cost optimization and delivery agility, as this is a fundamental prerequisite for the journey of digital transformation as well as of relationships with financial technology firms and the Pará State innovation ecosystem. In addition, modernization of Banpará's existing data center and construction of a backup data center are proposed. Each of these project components is discussed below. Banpará has already set up teams of internal staff and personnel from suppliers and outsourced service providers to start work on the digital transformation project (Figure 8).

Figure 8: Banpará's Digital Transformation Teams

Banpará staff digital transformation team

Banpará suppliers and outsourced process digital transformation team

Component ***1: Digital transformation of Banpará's IT Architecture***

Banpará seeks the support of USTDA for a consultancy to help define and implement a modern IT architecture capable of meeting the needs of the majority shareholder and clients with solid and scalable technological capacity, prepared for exponential growth. The definition and implementation of a solid and scalable reference technology architecture plays a strategic role in increasing the availability of Banpará's corporate systems, cost optimization, and delivery agility, fundamental prerequisites for the journey of digital transformation, including relationships with Fintechs and the Pará State innovation ecosystem.

The general objective of this project is to make Banpará's entire procedural instruction flow digital, through the generation and storage of transaction in an integrated database, promoting easy and simple access to services and products of the Bank, including deposits, loans, credit lines, and internal administrative processes such as payroll, training, and human resource management, facilitating management decisions.

More specifically, the consultants would design a plan to::

- Increase accessibility all relevant Bank records and other information;
- Automate procedures;
- Manage information to attain more efficient decision making ;
- Attain fluency in decision making;
- Achieve transparency in decision-making and wide dissemination of its impacts and results;
- Direct intellectual capital to the generation of knowledge;
- Record data for the generation and diffusion of specialized knowledge;

Component 2: Modernization of the Banpará data center and design of a new backup data center:

Banpará's data center and its backup are obsolescent and the backup data center lacks adequate security. As part of the Banpará's digital transformation, the existing data center would be progressively modernized, and a new backup data center constructed. Figure 9 shows some of the equipment in the Banpará's current data center. Figure 10 shows the existing backup data center, and Figure 11 shows a list of data center equipment with each item's power requirements.

Figure 9: Banpará's Current Data Center

Control room

Biometric access control

IBM EMC storage

Nutanix and Chassi HP

IBM cabinet

Connections

EMC storage

EMC storage

Chassi HP

Dell Sonic Wall NSA 4600

Dell Sonic Wall connections

Elgin cooling system

Power box

Fiber connections

Tape storage

External fiber connections

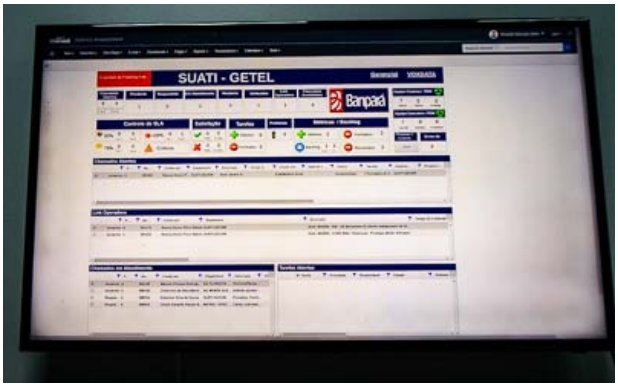
Telecom

More fiber

Embratel fiber connection

Cisco equipment - Switch

Datacom and Cisco equipment



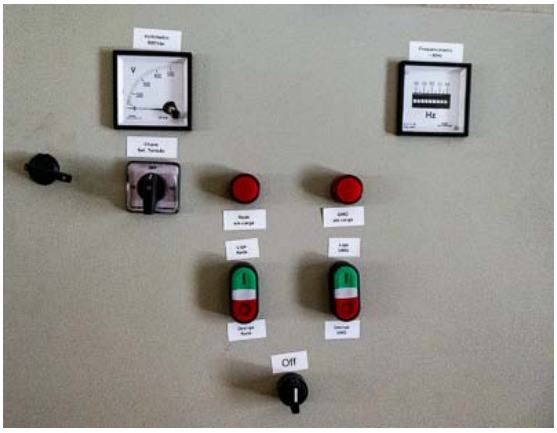
Monitoring panel

UPS battery module

UPS unit

Power in UPS room

Diesel generator and backup

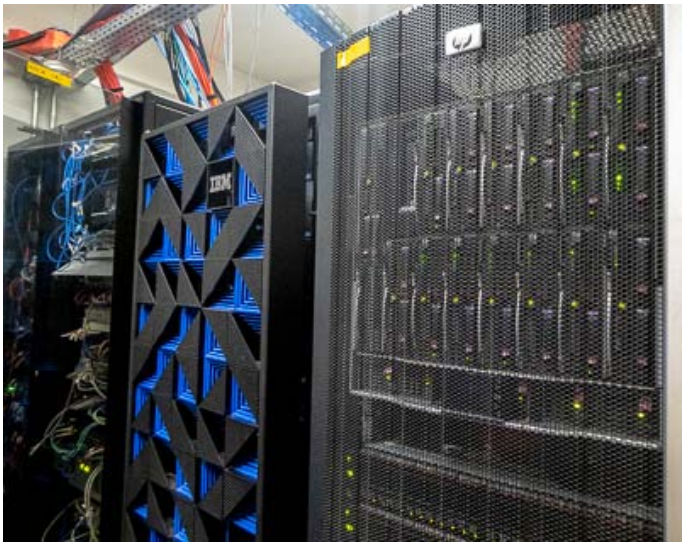


Power controls

More tape storage

Figure 10: Banpará Current Backup Data Center

Entrance



IBM mainframe and EMC storage

Rack Nutamix Backup

EMC storage

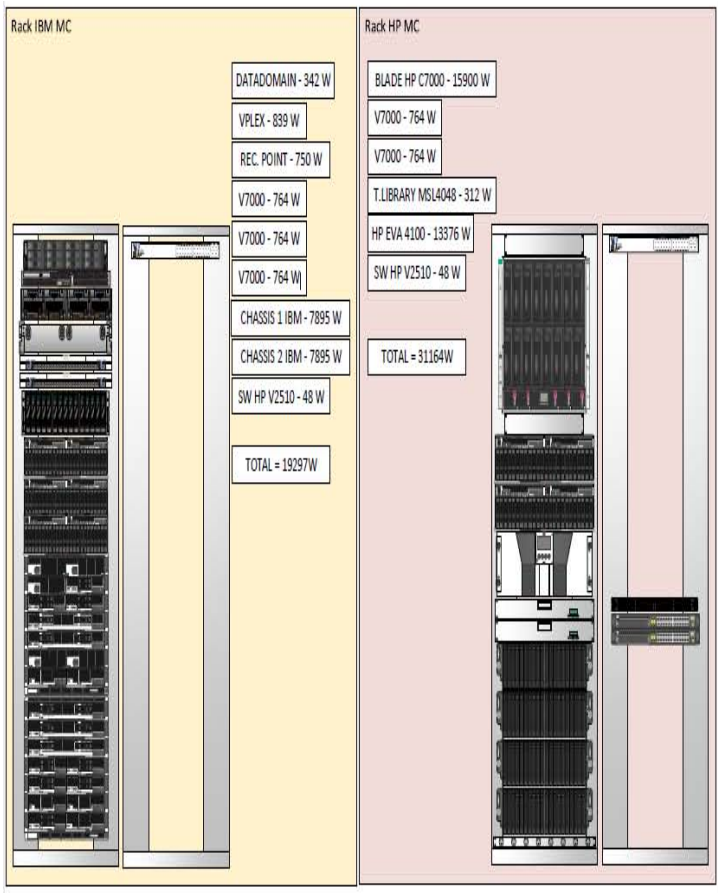
Telecommunications connections

Biometric access

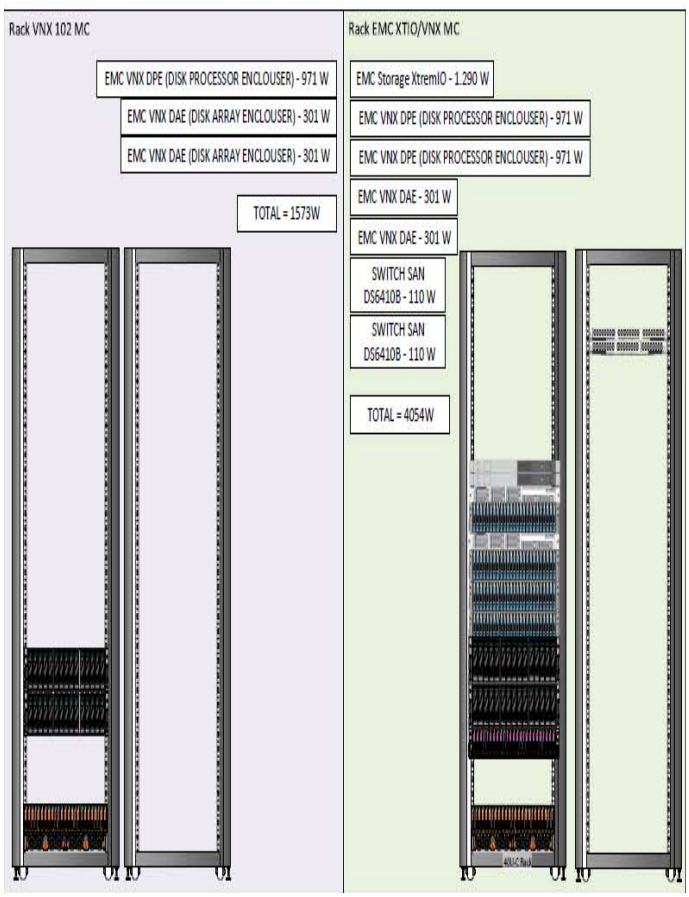
Nutanix

Backup diesel generators

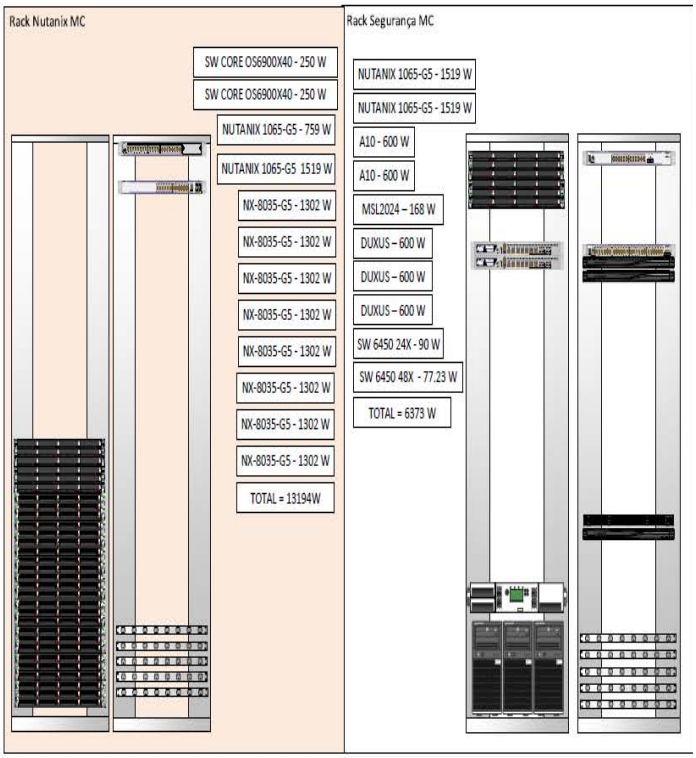
Figure 11: List of Datacenter Equipment with Power Requirements



Equipment List 1



Equipment List 2



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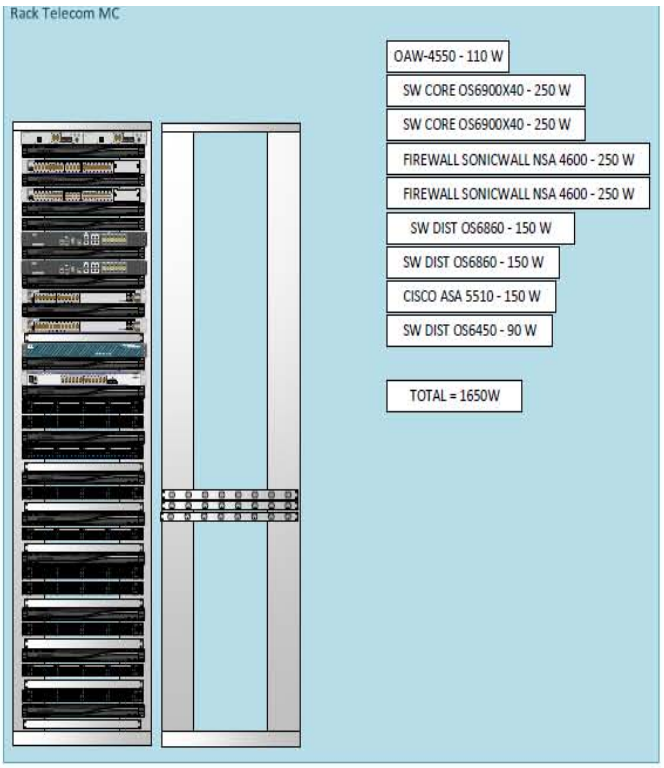
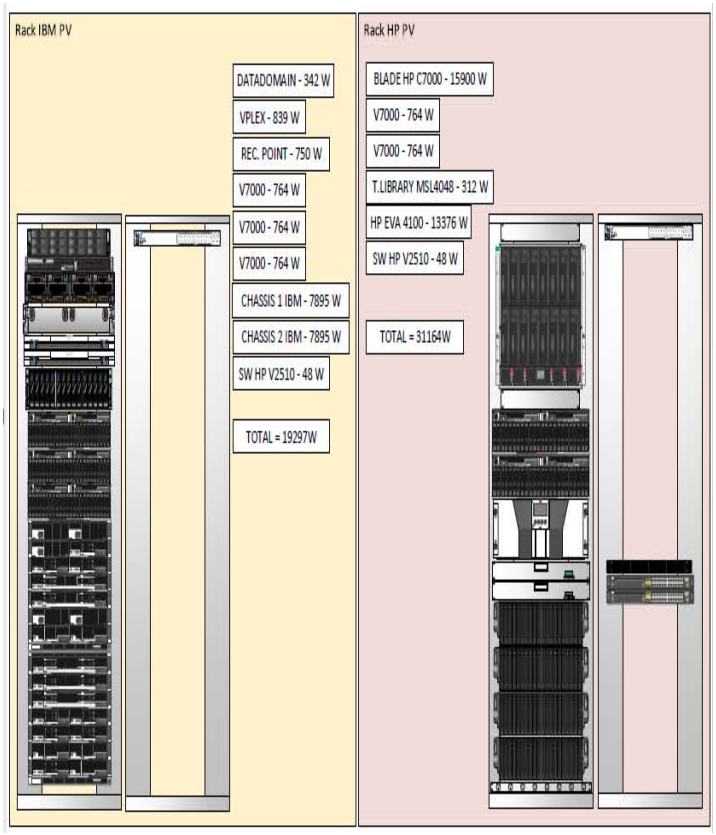
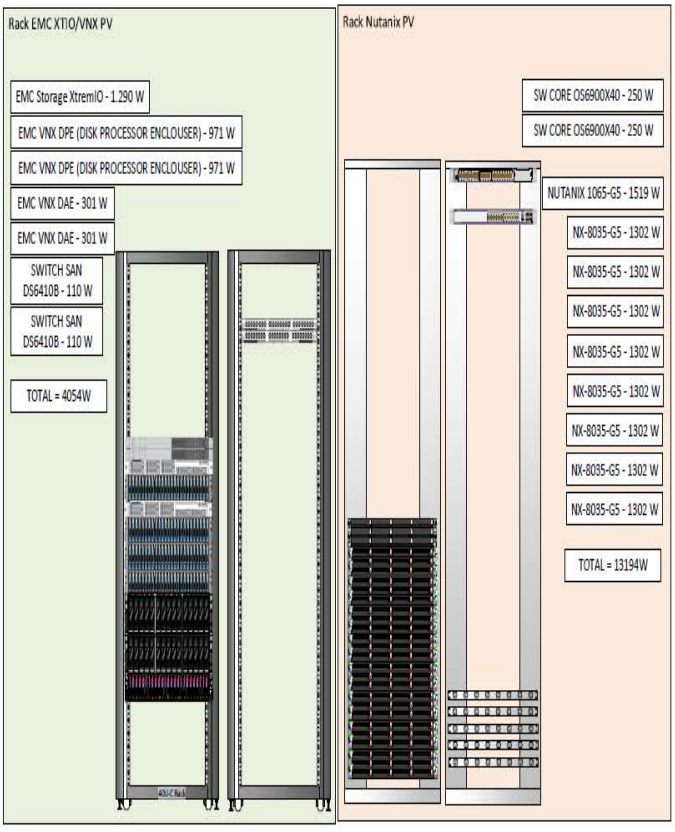


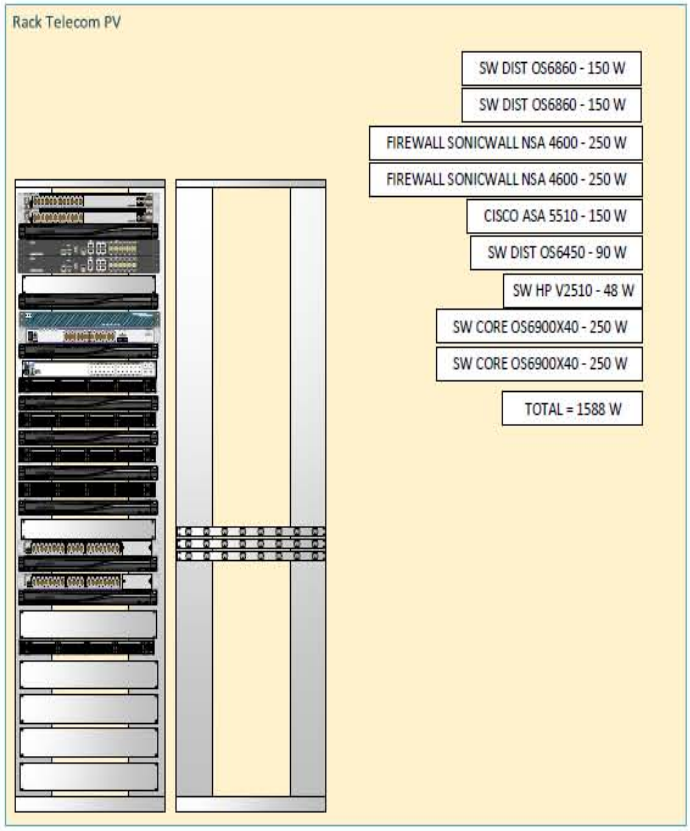
Equipment List 4



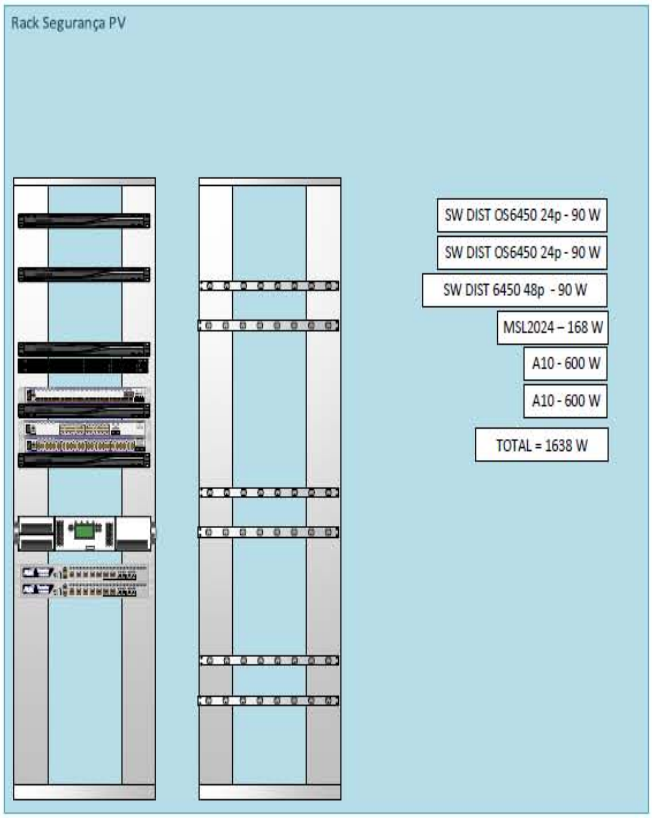
Equipment List 5



Equipment List 6



Equipment List 7



Equipment List 8

III. BANPARÁ COMMITMENT

Banpará's digital transformation is a high priority of its new President, who has provided a letter stating this priority and Banpará's commitment to financing the project (Annex V).

IV. POSSIBLE SOURCES OF PROJECT FINANCING

Domestic sources of finance include Banpará's internally generated resources, the National Bank for Economic and Social Development (BNDES), either through direct financing of Banpará or through suppliers of equipment; or the budget of the State of Para directly. International sources include the World Bank. It might be possible to reprogram an existing loan to the state or the federal government having categories that embrace the projects' objectives and are not disbursing. The Inter-American Development Bank (IADB) is another potential source of international funding, under conditions similar to the World Bank. A third potential international source is supplier's credits from firms interested in providing equipment and/or software. New loans from the World Bank or IADB would most likely be ruled out given the time it takes to receive federal government priority, appraise, approve and make them effective, though they cannot be ruled out, possibly in the context of a public administration reform loan.

V. POTENTIAL FOR U.S. EXPORTS AND FOREIGN COMPETITION

As detailed in Annex II, we estimate the export potential is US$46.1 million. U.S. firms are very strong in the ICT sector. Those who might bid on RFPs for this project include IBM, Microsoft, Dell ECM, Sun Oracle, Amazon Web Services, Google Cloud Services, APC, Eaton, Fortinet, and Symantec.

In digital transformation technologies US firms are industry leaders in data mining/visualization (Sisense, Oracle**,** Microsoft SharePoint, IBM, Cognos, and MicroStrategy), and work closely with Brazilian firms like Capterra that are active in electronic banking and bank management software such as Tandem.

In the existing Banpará data center and its backup, U.S. firms were extremely well represented. Figures 9 and 10 include photos showing many examples of US equipment, including Dell, EMC, Sun Oracle, IBM, Cisco, and Nutanix.

In H&A's view, U.S. technologies will continue to be very competitive for data center projects in Brazil. A number of U.S. products are viewed as best in class for the majority of the major equipment types required for data center construction. The data centers visited already have a history of employing U.S. technologies and this installed base creates incentives for continued employment of these technologies, such as seamless interoperability of new systems and old and reduced need for training of technical personnel.

US firms are very strong in the ICT sector. Those who might bid on RFPs for this project include:

- American Tower (telecommunications towers)
- Cisco (Network Infrastructure),
- HP (servers and storage, and cloud services),
- Dell EMC (servers, storage, hyperconverged systems),
- Sun Oracle (Database, BI, Storage, Cloud services, hyperconverged systems like Exadata),
- Microsoft (Data center Software, Database, OS, and cloud services (Azure)),
- IBM (servers, application software, and cloud services),
- BMC: (Infrastructure software),
- CA Technologies: (Infrastructure software)
- Cloudflare (software)
- Xterra (SDN solutions, Optical networking platforms)
- Ciena (adaptive networks, merged with Blue Planet specialized in network virtualization, etc.)
- Ceragon (wireless backhaul equipment)
- Corning Optical Communications (fiber optic cables and connectors)
- Microsoft Azure (cloud services)
- Amazon Web Services (AWS),
- Google Cloud Services and software
- APC & Eaton (Power supply & Generation)
- Fortinet and Symantec (Security Systems & Software)

Other US firms that manufacture equipment that could be used in the project and might interested in bidding include, Brocade, Juniper, Force 10, and Extreme (high performance switches and routers); Supermicro (servers), Fusion IO (SSD Storage), Kingston (memory chips), Western Digital (storage); Emerson, Schneider, Chatsworth, APC, and ADC (data center components including power

distribution, cooling, and fiber guides); AMD and Intel (CPUs and servers); Fortinet, McAfee, Norton & Symantec (anti-virus, network security); Clearfield (wireless and fiber broadband equipment); and Ubiquiti Networks, Streakwave, Netgear and Belkin (wireless broadband equipment). Despite increasing competition, especially from Chinese companies like Huawei and ZTE and for fiber optic cable, Furukawa (that has a factory in Brazil), US firms in the ICT sector are very competitive. Several US suppliers with Brazilian operations contacted by H&A are open to providing supplier financing: Cisco, Oracle, EMC, IBM, Dell, and Hewlett Packard. Most US suppliers have Brazilian subsidiaries, so market entry should not be an issue for them.

V. FOREIGN COMPETITION AND MARKET ENTRY ISSUES

Potential foreign competitors could include

- Lenovo: servers
- Hitachi: Storage
- NEC: Storage, servers, telecom
- ZTE: Network
- SAP: BI, Big Data, enterprise software
- Kaspersky: Security software

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VI. PRELIMINARY DEVELOPMENT IMPACT REVIEW

The U.S. firm shall identify and assess the developmental outcomes that would be expected if the project is implemented in accordance with the recommendations of the study.

Development Impact Measures are designed to help quantify the impact of USTDA's support for infrastructure development in emerging economies. This information is essential to USTDA's ability to set clear goals and measure the results of its programs, relative to the Agency's core objective of promoting United States private sector participation in development projects around the globe. Understanding the local impacts of USTDA's program supports the Agency's ability to design projects with a higher likelihood of implementation and a higher likelihood of U.S. export generation, thus supporting the Agency's mission.

Development Impact Measures should be viable, realistic and quantifiable. H&A evaluated development impact indicators from a list provided by USTDA At least one realistic and quantifiable Development Impact Measure was selected for each USTDA activity. In close consultation with the proposed project sponsor, a baseline measurement was established for each indicator, which will be used to compare future outcomes. The baseline is also used to set an anticipated timeline and determine how the information will be measured and collected once a project moves to implementation. This baseline information is incorporated into the Terms of Reference, which provides reporting guidance to the U.S. firm performing the USTDA activity. Banpará selected the following indicators.

All	Infrastructure Development and Efficiency Gains	Improved Output through Advanced Technology	New technologies introduced to a host country resulting in an increase of efficiency, capacity, or output/process improvement	$ value or Y/N

All	Promoting Effective Markets and Governance	Supporting Ability to Secure Financing	Implementation/utilization of USTDA recommendations enabled project sponsor and/or participants to secure financing (private or public)	$ amount of financing secure
All	Promoting Effective Markets and Governance	Supporting Regulation that Promotes Effective Governance	Adoption of policy, regulations or law that promotes effective governance of a sector or market (including compliance with a bilateral or multilateral policy or trade agreement)	Y/N*

VII. EVALUATION STRATEGY

Benchmarks to help USTDA evaluate success of project

- Financing for project is obtained. The amount from each source should be specified.
- Issue of RFPs for purchase of software and equipment with international competitive bidding, in months from date finance approved. This is a complex process in Brazil and sometimes takes months. The faster it is accomplished, the better managed is the state and the executing agencies.
- Bids received and winners selected. Success can be measured as the percentage of total won by U.S. firms
- Purchases completed. Metric; time in months from selection of winning bids.
- Percentage of total software and equipment purchased provided by U.S. firms
- Construction and equipping initiated. Metric: time in months from purchase of equipment.
- Construction and equipping completed. Metric: time in months from the initiation of construction.
- Full planned digital transformation in operation. Metric: time in months from completion of construction. Includes time for installing software and testing.

Proposed project implementation timeline

Stage	**Objective**	**Months to Execute**
1	Signing of the contract with USTDA	4
2	Preparation of U.S. firm's consultancy reports for the datacenter and network	6
3	Preparation of the RFPs (*editais*) for equipment, software, and services	4
4	Bidding process, including selection of winners	4

5	Acquisition and installation of software and equipment, contracting of services.	48

According to this timetable the digital transformation program should be fully implemented in 66 months from the time the project bids are received. The long acquisition and installation period is because Banpará estimates that equipment purchases will be carried out gradually over a four year period, since the expansion of the network will require training and expanding BANPARÁ's technical and managerial staff as the digital transformation proceeds.

Likelihood of development

The project a high priority of Banpará as indicated in Annex V.

Potential difficulties

- Changes in Banpará's management team that result in poorer project management
- Unfavorable changes in government policies such that the project no longer has strong political support

VIII. ENVIRONMENTAL IMPACT – CLIMATE RESILIENCE

A climate resilience assessment looks at the impact of climate on a potential project and involves two phases: (1) screening and (2) in-depth analysis. Screening identifies potential climate risks, vulnerabilities, and opportunities pertaining to a program or investment, determines if additional analysis is required, and if so, helps to scope that analysis. In other words, it is intended to either identify what further study is required or determine that further analysis is not warranted.

Where needed, in-depth analyses evaluate relevant technical, social, economic, and political aspects of climate risks, uncertainties, and design options. They produce recommendations on how to address the climate risks identified, both in the short term and the long term.

The DM Consultants along with senior staff in Banpará reviewed USTDA's Climate Resilience requirements for screening and in-depth analysis and determined that an in-depth analysis is not warranted for this project.

IX. IMPACT ON U.S. LABOR

The impact on US labor would be negligible or positive. Brazilian bank data centers and broadband networks do not displace US data centers like those of Amazon and Microsoft since the Brazilian banks want the data centers to be in Brazilian territory, usually with a preference for their own states or *municípios*. And Banpará is even considering cloud providers like Amazon Web Services and Microsoft's Azure for some less-sensitive data storage. For digital transformation of banks and other Brazilian institutions, there is no displacement of US facilities. Thus, the impact on US labor is expected to be positive to the extent that US-based firm provide equipment, software and services produced in the US.

X. JUSTIFICATIONS & RECOMMENDATIONS

As this report has documented, the project will have high developmental impact in the State of Pará

by supporting improved banking services that serve government, businesses, and agricultural producers.

The project will directly benefit U.S. companies and it will foster the development of partnerships between Government agencies and U.S. IT companies by bringing proven private sector solutions to the challenges that the Government faces. This project meets USTDA's goals of providing technical assistance in cases where that assistance helps create partnerships based on the premise that private sector experience, technology, and ingenuity are integral to development and project sustainability.

Moreover, the involvement of a U.S.-based Consultant Team in carrying out the proposed feasibility studies should work to the advantage of U.S.-based suppliers of information technology equipment in forming key partnerships with Banpará. These suppliers are strong in the major technological areas but face growing competition from foreign suppliers.

Accordingly, H&A believes that funding of the feasibility study on behalf of Banpará would represent a good use of USTDA resources.

XI. QUALIFICATIONS OF PROFESSIONALS IN BANPARÁ IT TRANSFORMATION PROJECT

Our analysis has shown that we would require eight staff for this project, including a Team Leader and Project Coordinator. Below you will find specific descriptions for each of the staff we are recommending

Team Leader

- At least fifteen (15) years of experience in the ICT industry.
- Strong background in at least one of major areas of the feasibility study (big data, AI, data centers, Governance IT, Architecture of IT and financial project analysis).
- Both a U.S and an international perspective on the IT industry, with the international perspective preferably gained through on-the-ground project work.
- Management, organizational and cross-cultural skills and perspective to structure, oversee and carry out the technical assistance effectively.
- Ability to communicate findings effectively and to liaise appropriately within Banpará and with other stakeholders, including potential private sector partners.
- Strong Portuguese language skills, written and spoken is required.

Senior Data Center Electrical Engineer

- Post-graduate degree in computer science, electrical engineering or related discipline
- At least ten (10) years of experience in the telecom/ICT industry, and/or financial industry, including hands-on experience with data centers and outsourcing contracts for data centers
- At least five (5) years of' experience in defining and monitoring service level agreements (SLAs) for ICTs and/or financial institutions
- Expertise in the economic and financial analysis of projects and feasibility studies involving rapid technological change, including total cost of operations (TCO) and return on investment (ROI) analysis
- Detail-oriented and able to prioritize
- Experience serving in technical consultative role

- Excellent written and verbal communication skills, including technical writing
- Excellent ability to clearly explain advanced technical issues in manner that is easily understood
- Strong interpersonal and customer service skills
- Strong sense of personal responsibility and accountability for delivering high quality work
- Ability to work well both independently and on teams
- Portuguese language skills, written and spoken, preferred

Junior Data Center Electrical Engineer

- At least an undergraduate degree in electrical engineering or related discipline
- At least five (5) years of experience in the telecom/ICT industry, including hands-on experience with data center design and implementation
- Knowledge of configuration management, problem management, change management, help desk, distribution and control of software, managing of service levels (SLM), capacity management, contingency planning, availability management, and cost management – as applied to data centers
- Expertise in the economic and financial analysis of projects and feasibility studies involving rapid technological change, including total cost of operations (TCO) and return on investment (ROI) analysis
- Detail-oriented and able to prioritize
- Experience serving in technical consultative role
- Excellent written and verbal communication skills, including technical writing
- Excellent ability to clearly explain advanced technical issues in manner that is easily understood
- Strong interpersonal and customer service skills
- Strong sense of personal responsibility and accountability for delivering high quality work
- Ability to work well both independently and on teams
- Portuguese language skills, written and spoken is preferred

Senior Data Architect

- Post-graduate degree in computer engineering or related field.
- At least ten (10) years of experience in the IT industry.
- At least eight (8) years' experience with implementing, verifying, designing, and maintaining software systems
- At least eight (8) years' experience with building data architecture for ingestion, processing, and surfacing of data for large-scale applications
- At least eight (8) years' experience in a data analysis or management role
- Knowledge of C and PHP languages and knowledge and experience in using many different scripting languages, understanding the nuances and benefits of each, to combine systems
- Proven ability to work in distributed systems
- In-depth understanding of database structure principles
- Experience gathering and analyzing system requirements
- Knowledge of data mining and segmentation techniques
- Proficiency and expertise in using SQL and Oracle required
- Proficiency with Excel and familiarity with data visualization tools

- Creative problem solver
- Ability to communicate findings effectively and to liaise appropriately with other members of the data team, including data engineers, and data scientists and within BANPARÁ and with other stakeholders, including potential private sector partners.
- Portuguese language skills, written and spoken, preferred.

Senior IT Systems Engineer

- Post-graduate degree in computer engineering, or related discipline
- At least ten (10) years of experience in the IT industry, including hands-on experience with the design, operation, and maintenance of IT systems in banks
- Knowledge of state-of-the-art IT systems architecture for banks.
- Experience gathering and analyzing system requirements
- Knowledge of data mining and segmentation techniques
- Proficiency and expertise in using SQL and Oracle required along with a proficiency with Excel and familiarity with data visualization tools
- Creative problem solver, critical thinking,
- Excellent communications skills along with the ability to communicate findings effectively and to liaise appropriately with other members of the data team, including data architects, data engineers, data analysts, and data scientists and within Banpará and with other stakeholders, including potential private sector partners.
- Experience with banking IT systems
- Portuguese language skills, written and spoken, preferred

Junior IT Engineer

- An undergraduate degree in computer science, electrical engineering or a related discipline
- At least five (5) years of experience in the IT industry including hands-on experience with the design, operation and maintenance IT systems, including big data and AI.
- Experience in defining and monitoring service level agreements (SLAs) for ITs.
- Expertise in the economic and financial analysis of projects and feasibility studies involving rapid technological change, including total cost of operations (TCO) and return on investment (ROI) analysis.
- Portuguese language skills, written and spoken required.

Senior Economist

- At least a master's degree in economics, PhD preferred
- A minimum of ten (10) years of experience in economic analysis of ICT projects
- Experience with cost/benefit analysis
- Experience analyzing the development impact of ICT projects
- Detail-oriented and able to prioritize
- Experience serving in technical consultative role
- Excellent written and verbal communication skills, including technical writing
- Excellent ability to clearly explain advanced technical issues in manner that is easily understood
- Strong interpersonal and customer service skills
- Strong sense of personal responsibility and accountability for delivering high quality work
- Ability to work well both independently and on teams

- Strong Portuguese language skills, written and spoken, preferred

Brazilian Environmental Expert

- Post-graduate degree in environmental engineering or related discipline.
- At least five (5) years of experience applying Brazilian environmental legislation in project analysis.
- Knowledge of environmental impact of data center projects
- Strong English language skills, written and spoken is required

Project Coordinator/Local Manager

The responsibilities of the Project coordinator include, but are not limited to, the following:

- Basic support logistics for everyone on team and their support people to ensure a smooth running of the project, such as deliverable coordination (formatting, timeliness, and other coordination)
- Travel coordination, Arranging workshops and conferences in person and by telephone
- Managing and editing of deliverables, thereby ensuring that the deliverables closely follow the scope of work outlined and avoiding surprises
- Reviewing, coordinating and distributing presentation materials, both the electronic and paper versions of presentations
- Developing and creating a library of resource material so that all consultants have easy access to any resource material, 24x7, maintaining the library
- Arranging housing and payments for project related expenses
- Coordinating with Project Manager on Project Finance issues such as expense payments, consultant time.
- Arranging logistics for conferences and workshops
- Fluency in written and spoken Portuguese and English is required

XII. TERMS OF REFERENCE

These terms of reference ("Terms of Reference") in this Annex I set forth the terms, conditions, provisions and specifications for the performance of the technical assistance ("TA") for the benefit of Banco do Estado do Pará S.A. - Banpará (the "Grantee" or the "Client" or "Banpará"). The U.S. firm selected to perform the TA (the "U.S. Firm") shall perform the TA in accordance with these Terms of Reference pursuant to this Agreement of Understanding between the U.S. Firm and the Client, of which Agreement of Understanding this Annex I is a part.

The U.S. Firm's delivery of the TA must comply with the entirety of these Terms of Reference, and any modification of or deviation from these Terms of Reference must be approved in writing by USTDA in accordance with the procedures for amendments or other modifications under this Agreement of Understanding. The U.S. Firm acknowledges and agrees that (i) any performance by the U.S. Firm of work not included in, or not in compliance with, these Terms of Reference, or any failure by the U.S. Firm to perform any work set forth under these Terms of Reference (in compliance with those terms), will be ineligible for approval or payment, absent an amendment or other modification in accordance with such procedures, and (ii) failure to obtain prior written approval from USTDA for any modifications or deviations from these Terms of Reference may result in forfeiture of payment for work performed that is not in compliance with these Terms of Reference and/or a significant delay in payment of the final invoice.

The objective of the TA is to develop a digital integration strategy, which will enable the Grantee to modernize, integrate and expand its ICT infrastructure (the "Project"). The TA would develop a digital implementation strategy to fully automate the Grantee's products and services, including deposits, loans, credit lines, and internal administrative processes such as payroll, training, and human resource management, as well as the storage of all transactions in an integrated database. The TA would also develop a unified approach to upgrades to ensure that all systems are interoperable and can support required cybersecurity technologies. Lastly, the TA would provide recommendations for the modernization of Banpará's data center, cloud services, and the design for a new backup data center.

The U.S. Firm shall undertake a quality control review process, including a technical and editorial review, of all deliverables and documents submitted to the Grantee to ensure readability, accuracy, and consistency. All deliverables and documents shall be submitted in draft form to the Grantee for review and comment prior to finalization. The deliverables specified in these Terms of Reference shall serve to keep the Grantee informed about the U.S. Firm's work on the TA and to ensure that the U.S. Firm's work is performed satisfactorily, in accordance with applicable Agreement of Understanding provisions and the terms and conditions of the USTDA Grant Agreement (per Clause G of Annex II of the Grant Agreement). All deliverables and the Final Report shall be submitted in English and Portuguese.

Any meetings or other actions or work set forth under these Terms of Reference that are indicated to occur in-person, on-site or otherwise in a specified location may, if agreed by both the Grantee and the Contractor (and with advance notice to and written agreement from USTDA), be conducted remotely, including online, by teleconference, by videoconference, or by other means, provided that the Contractor shall clearly document in the corresponding deliverable report the date on which

such agreement was reached and approved by USTDA, and shall describe the alternative means of accomplishing the relevant work, along with the rationale for such decision.

Further, if the Grantee and the Contractor propose to apply such a change to any tasks or subtasks in part (i.e., to change portions of a task/subtask from in-person to remote, while maintaining other portions as in-person, including the "breaking up" of a task or subtask in order to separate remote from in-person work), then: (i) the Grantee and/or the Contractor shall notify USTDA in advance of such a proposal, and USTDA may, in its discretion, approve of such proposal and formalize the proposed modification through an implementation letter to the Contract; and (ii) USTDA may, at its discretion, modify the Payment Schedule under the Contract in order to separate such remote and in-person work into separate payments, as appropriate, again through an implementation letter to the Contract. Notwithstanding the foregoing under this paragraph, USTDA reserves the right to make any appropriate adjustments to the total Grant Amount (and therefore the Contract value) that may result from any such modifications.

TASK 1: DATA COLLECTION

DATA CENTERS

The U.S. Firm shall conduct a review of the relevant literature on state-of-the art data centers for banks. The U.S. Firm shall then research the planning, financing, construction, and operation of datacenters (reviewing at least four Brazilian and four international case studies). In analyzing each of these Brazilian and international examples, the U.S. Firm shall identify, analyze and detail the best practices in planning, finance, construction and operation.

BANPARÁ DIGITAL TRANSFORMATION

The U.S. firm shall conduct a review of the relevant literature on digital transformation plans for banks (including the latest forms of eBanking, cyber security, data analytics, and data management). This review shall include analysis of at least four Brazilian and four international case studies. In analyzing each of these Brazilian and international examples, the U.S. Firm shall identify, analyze and detail the best practices of state-of-the art IT systems for banks.

The U.S. Firm shall develop a preliminary work plan and schedule for the completion of these Terms of Reference. The preliminary work plan and schedule described in this Task shall be consistent with these Terms of Reference, and, in the event of any inconsistency, these Terms of Reference shall prevail. At least seven (7) calendar days prior to the U.S. Firm's initial visit, the U.S. Firm shall deliver the preliminary work plan to the Grantee for review and approval.

Deliverable #1: The U.S. Firm shall prepare a report detailing all work performed under Task 1, including the case studies, and best practices identified and recommended for the data center and digital transformation plan. The U.S. Firm shall also deliver a preliminary work plan and schedule.

TASK 2: KICK-OFF MEETINGS AND ASSESSMENT OF CURRENT INFRASTRUCTURE

The US firm shall familiarize itself with the Brazilian financial sector and project analysis via Internet research and any documents provided by Banpará.

The U.S. Firm shall then travel to Belém to meet with Banpará and conduct Tasks 2, 3 and 4. The U.S. Firm shall discuss the preliminary work plan and schedule with Banpará to confirm and elaborate the basic objectives for the data center and digital transformation, which includes the need to meet the growing demand for banking services in the state of Pará with agility, flexibility and efficiency. Based on the meetings with Banpará, the U.S. Firm shall make any agreed upon revisions to the Work Plan (it being understood that any revised work plan shall be consistent with these Terms of Reference) and timetable and prepare a list of any additional data needed.

Deliverable #2: The U.S. Firm shall prepare a report of all work performed under Task 2, including, without limitation, a list of documents and other materials studied, details of all meetings and site visits, and all relevant findings and conclusions.

TASK 3: NEEDS/REQUIREMENTS ANALYSIS FOR IT TRANSFORMATION

While in Belem, the U.S. Firm shall meet with Banpará and conduct a needs/requirements analysis for Banpará's digital transformation.

The U.S. Firm shall:

- Meet with the Banpará's managers to gain additional insights into their needs, priorities, and expectations;
- Conduct a needs and requirement analysis for Banpará branches;
- Conduct basic cost/benefit analyses for Banpará's digital transformation, taking into consideration the needs of its clients; and
- Quantify the benefits in unit cost reduction and improved quality for Banpara's internal operations and banking services expected from the digital transformation program.

Deliverable #3: The U.S. Firm shall prepare a report of all work performed under Task 3, including, without limitation, details of all meetings and site visits, and all relevant findings and conclusions. The U.S. Firm shall also deliver a Needs/Requirements Analysis report for the IT transformation.

TASK 4: NEEDS/REQUIREMENTS ANALYSIS FOR THE DATA CENTER/BACKUP DATA FACILITY

While in Belem, the U.S. firm shall review the current equipment, software, and locales of Banpará's data centers; meet with Banpará and conduct a needs/requirements analysis for the new datacenter and backup datacenter.

The U.S. Firm shall:

- Meet with Banpará's managers and major stakeholders (with guidance from Banpará) to gain additional insights into their needs, interests, and expectations;
- Visit Banpará's data center and backup data center and conduct a needs and requirements analysis for the expanded data center and backup facility;
- Conduct a security analysis of the present datacenter and determine the best means to upgrade software, hardware, and facilities to take to ensure the security and privacy of the information contained in the expanded datacenter and backup facility;
- Quantify the benefits in unit cost reduction and improved quality for Banpara's datacenter services that can be achieved with the proposed specialized data center and backup facility; and
- Analyze at least three options for operation of the data center and backup facility, including use of commercial cloud computing facilities for part or all of Banpará's data processing and storage needs.

Deliverable #4: The U.S. Firm shall prepare a report of all work performed under Task 4, including, without limitation, details of all meetings and site visits, and all relevant findings and conclusions. The U.S. Firm shall also deliver a Needs/Requirements Analysis report for the data center/backup facility.

TASK 5: DEVELOP DIGITAL TRANSFORMATION ARCHITECTURE

The U.S. firm shall:

- Analyze the findings from Task 3 and develop specifications regarding the ICT architecture needed to implement Banpará's digital transformation; and
- Develop precise estimates of digital transformation designs, equipment needs and capacity, and resulting capital expenditure and operating costs.

Deliverable #5: The U.S. Firm shall prepare a report on all work performed under this Task including digital transformation design, specifications and architecture.

TASK 6: DEVELOP FUNCTIONAL SPECIFICATIONS, ARCHITECTURE, AND DESIGN OF THE DATA CENTERS

The U.S. Firm shall:

- Analyze the findings from Tasks 4 and 5 and develop specifications regarding the architecture and design (including software) of the modernized datacenter, its backup data center, and any cloud storage options Banpará may choose after reviewing the findings of task 4;
- Develop precise estimates of data center design including equipment needs and capacity, and resulting capital expenditure and operating costs;
- Propose and draft service level agreements (SLAs) for the modernized datacenter and the new backup data center;
- Prepare an inventory of requirements for supporting critical and non-critical applications;
- Estimate and project data center power supply requirements and cost over the next five years;

- Specify and project data center cooling requirements and cost over the next five years;
- Specify standby power requirements and fire safety requirements; and
- Specify guidelines for selecting data center construction contractors.

Deliverable #6: The U.S. Firm shall prepare a report on all work performed under this Task, including the data center design, functional specifications and architecture.

TASK 7: DIMENSIONING AND ALTERNATE SCENARIOS

Based on the findings of Tasks 1-7, the U.S. firm shall:

- Project the needs for data storage over the next five years and estimate the magnitude of data or cloud storage requirements;
- Develop two alternative scenarios for data storage, one involving some use of cloud services and one based on exclusive use of the modernized data center and the new backup data center; and
- Evaluate the cloud deployment option;

In consultations with Banpará, the U.S. Firm shall recommend an optimum strategy for the data center and backup facility, and recommend a redundancy strategy utilizing the current storage capacity.

Deliverable #7: The U.S. Firm shall prepare a report on all work done under this Task, including summarizing the alternative strategies studied and recommendations for the optimum strategies for the data center and backup, including various storage and cloud scenarios.

TASK 8: ROLES AND RESPONSIBILITIES

DATACENTER

The U.S. Firm shall conduct a study of the future roles and responsibilities of the various actors involved for the operation and management of the datacenter and backup facility, including the legal, institutional, structural and service levels. The study of roles and responsibilities shall address, at a minimum, the following issues/questions:

- Who will administer the data center and backup facility?
- How will performance of the datacenter be measured?
- If there is a private partner, how should it be remunerated?
- What should be the role of Banpará once the new datacenter and backup facility are operational?

For the operation of Banpará's digital transformation, the U.S. Firm shall conduct a study of the future roles and responsibilities of the various actors involved, including the legal, institutional, structural and service levels.

Deliverable #8: The U.S. Firm shall prepare a report on all work performed under this Task, including a report of the roles and responsibilities for implementation of Banpará's digital transformation and data center modernization strategy.

TASK 9: ECONOMIC AND FINANCIAL ANALYSIS

The U.S. Firm shall prepare an economic and financial analysis report and a report recommending the most effective structure and the supporting legal, economic and financial rationales. As a basis for these reports, the U.S. Firm shall perform the following assessments and analyses, which shall be detailed in one or both of these reports:

- Quantify the benefits in unit cost reduction and improved quality for the data centers and improved quality for Banpará's services as a result of its digital transformation;
- Assess all aspects of the project's feasibility (technical, economic, financial, political, legal and organizational) and their interrelations for the data center and digital transformation;
- Develop Business Continuity and Disaster Recovery Plans;
- Evaluate Total Cost of Ownership of the Banpará data centers;
- Develop an Implementation Plans, i.e., the roadmap, along with a finance plan for the Banpará data center; and
- Prepare risk analysis, rate return analysis, and analysis of total cost of operation.

Deliverable #9: The U.S. Firm shall deliver a report of all work performed under this Task, including the economic and financial analysis report and a report recommending the most effective structure and their supporting legal, economic and financial rationales.

Task 10: PRELIMINARY ENVIRONMENTAL IMPACT ASSESSMENT

The U.S. Firm shall conduct a preliminary environmental impact assessment of the implementation of the data center modernization and digital transformation. At a minimum, the U.S. Firm shall:

- Include a preliminary environmental impact analysis, including compliance with federal, state, and municipal governments as well as the requirements of potential lending agencies, especially the World Bank, the IFC, and the IADB;
- Identify anticipated positive and negative environmental impacts from implementation;
- Recommend ways to maximize positive impacts and minimize negative impacts; and
- Identify any actions that must be taken in advance of implementation to satisfy environmental impact requirements.

Deliverable #10: The U.S. Firm shall prepare a report of all the work performed and findings under Task 10.

TASK 11: DEVELOPMENT IMPACT ASSESSMENT

The U.S. Firm shall identify and assess the developmental outcomes that would be expected if the Project is implemented in accordance with the recommendations of the TA. Development Impact Measures are designed to help quantify the impact of USTDA's support for infrastructure development in emerging economies. This information is essential to USTDA's ability to set clear goals and measure the results of its programs, relative to the Agency's core objective of promoting United States private sector participation in development projects around the globe. Understanding the local impacts of USTDA's program supports the Agency's ability to design projects with a higher

likelihood of implementation and a higher likelihood of U.S. export generation, thus supporting the Agency's mission.

At least one realistic and quantifiable Development Impact Measure is selected for each USTDA activity. In close consultation with the Grantee, a baseline measurement is established for each indicator, which is used to compare future outcomes. The baseline is also used to set an anticipated timeline and determine how the information will be measured and collected once a project moves to implementation.

The Development Impact Report shall assess the baseline and actual values of the indicator listed below:

Category	***Indicator***	***Description***	***Anticipated Outcome***
Infrastructure Development and Efficiency Gains	Improved Digital Communication Access	Additional and improved online platforms will increase access to banking products and services	*Y*
Infrastructure Development and Efficiency Gains	Improved Data Management and Security	New technologies introduced, resulting in an increase of efficiency, security and interoperability of systems.	*Y*

Deliverable #11: The U.S. Firm shall prepare and deliver a report of all work performed under Task 11, including (without limitation) the Development Impact Analysis, as described above.

TASK 12: PROJECT PLANNING AND IMPLEMENTATION

The U.S. firm shall assess and determine what the critical goals and success factors are for Project implementation and shall identify relevant risks and risk mitigation measures to achieve these goals/success factors. The analysis shall address the following goals/success factors:

- Banpará shares with any private sector partners the benefits of productivity increases arising from technological change, and not just the costs;
- Continual monitoring of the contractual conditions in relation to the market is carried out – provisions for this need to be incorporated in the contract itself;
- Training of Banpará personnel in the management of outsourcing, SLAs, service level management (SLM), etc.;
- Top management necessary to achieve efficient Project implementation are involved and supportive of the Project;
- Priority is obtained for any payments to public or private sector partners for strategic and critical activities outsourced;
- Clear definition of contract objectives (scope, service levels, metrics, requirements, etc.);
- Any new regulations that need to be enacted or whose enactment may be detrimental to the Project;
- Penalties for noncompliance with contract conditions are established and applied if violations are detected;
- A clear process is defined for exiting from the contract and transition to one or more other private sector partners with operating responsibilities for Banpará's digital transformation;

and

- Other critical success factors inherent in any outsourcing for ICT services and means to achieve them defined.

The U.S. Firm shall also create several evaluation criteria for USTDA to evaluate the successful implementation of the Project. These criteria shall include:

- Benchmarks to help USTDA evaluate success of project;
- Proposed project implementation timeline;
- How the project will be developed (Engineering, Procurement, Construction, Turnkey, Build-Own-Operate, Build-Own-Transfer);
- Likelihood of development;
- Potential difficulties that the Project Sponsor might need to overcome;
- Additional regulations that need to be in place; and
- Other entities that need to approve the project.

The U.S. Firm shall prepare a Project Implementation Report, which shall include (i) a detailed recommendation concerning the most appropriate structure for the Project, (ii) a detailed breakdown of the steps that need to be undertaken by Banpará to implement the Project according to the recommended structure, including recommendations for handling any outsourcing or infrastructure sharing arrangements with private sector firms, and (iii) recommendations on planning and implementing the phased approach/evolving scope of the datacenter.

The U.S. Firm shall also identify U.S. sources of supply for all goods and services required to implement the Project. In particular, the U.S. Firm shall list U.S companies that provide the technologies or services to be implemented. Detailed information about U.S. companies shall be included in the Final Report, including potential products/services, a point of contact in Brazil if available, or where sales to Brazil are managed. The business name, point of contact, address, telephone and e-mail address shall be included for each commercial source.

Deliverable #12: The U.S. Firm shall prepare a report of all the work performed and findings under Task 12, including a Project Impact Report, a Project Implementation Report, and a Sources of Supply Report.

TASK 13: DRAFT FINAL REPORT

Upon concluding all tasks listed above, the U.S. Firm shall travel to Belém to formally present to Banpará the findings and recommendations and a near final version of the report. Banpará will be able to use this opportunity to ask questions or provide further comments and suggestions based on the presentation and draft of the Final Report. To support the presentation of the study the U.S. Firm shall:

- Create an accompanying PowerPoint presentation; and
- Identify any additional suggestions or recommendations derived from Banpará's responses to the presentation.

Deliverable #13: The U.S. Firm shall travel to Belém to present the draft Final Report and PowerPoint Presentation.

TASK 14: FINAL REPORT

Once Banpará has provided comments and revisions to the draft Final Report, the U.S. Firm shall make the necessary changes and modifications to the draft Final Report, it being understood that the U.S. Firm shall not make any changes or modifications that are inconsistent with these Terms of Reference.

The U.S. Firm shall prepare and deliver to Banpará and USTDA a substantive and comprehensive final report of all work performed under these Terms of Reference (the "Final Report"), which must conform to the requirements under Clause I of the Mandatory Agreement of Understanding Clauses (as defined in Annex II). The U.S. Firm shall prepare the Final Report in English and Portuguese. The U.S. Firm shall organize the Final Report into chapters and sections with clear labels corresponding to each of the above tasks and sub-tasks of these Terms of Reference, and the U.S. Firm shall include in the Final Report all deliverables and documents that have been provided to the Client under these Terms of Reference. The U.S. Firm shall incorporate into the Final Report (i) all of the findings, recommendations and conclusions of the TA under these Terms of Reference, and (ii) all other documents and/or reports provided pursuant to the tasks noted above, in each case clearly organized and labeled according to each task and sub-task under these Terms of Reference. The U.S. Firm shall also include an executive summary to the Final Report as a whole, and provide a summary for each task under the Terms of Reference.

The U.S. Firm shall provide the Grantee with one (1) copy of the Final Report on CD-ROM. The CD-ROM version of the final report shall include:

- Adobe Acrobat readable copies of all documents;
- The summary power point presentation;
- Source files for all drawings in AutoCAD, Visio, or Bentley MicroStation format;
- Source files for any analytical tools used to complete the TOR;
- Source files for all documents in Microsoft Office 2000 or later formats.

ADDITIONAL COMMENTS

Comment 1: All Deliverables are to be supplied in both English and Portuguese. The U.S. firm shall ensure the quality and accuracy of the translations.

Comment 2: More specific requirements concerning the composition of the consultant team are given in Section 12 of the Definitional Mission report.

Comment 3: Successful execution of the Feasibility Study (FS) presupposes that a) the U.S. Firm shall establish a close working relationship between itself and Banpará; b), that the U.S. Firm is prepared to spend the necessary amount of time on-site in-country; and c) the consultant team has appropriate access to Banpará officials and personnel, resources and data. Successful performance of the FS is dependent on full and timely availability of the resources in question. It is expected that candidate U.S. firms for carrying out the feasibility study will address these issues in their proposals, both in general terms and in terms of specific requirements (e.g., for desk space, phone/fax, Internet connection).

XIII. SUGGESTED EVALUATION CRITERIA

It is suggested that the selection of the U.S. firm for both of the studies be based on the following criteria:

Criterion	**Max. Points**
• Expertise and skills of proposed personnel along with relevant technical experience of telecommunications networks, data centers implementation of networks and datacenters • Experience supporting finance and telecommunication roll-outs • Finance and telecommunication sector project and regulatory experience in Latin America and specifically in Brazil; and • Experience designing and implementing telecommunication projects in Brazil.	50
• Proposed approach to the TA and to the individual tasks. • Adequacy, soundness, and thoroughness of the Offeror's proposed Technical Approach and Work Plan	30
• Pertinent international experience and cross-cultural skills along with relevant interdisciplinary experience of proposed personnel related to the Project.	20
Total:	**100**