Open Source Software in eGov

Policy of GoI on adoption of OSS

The "Policy on Adoption of Open Source Software for Government of India" (hereinafter referred to as "Policy") will encourage <u>the formal adoption and use of Open Source Software (OSS)</u> in Government Organizations.

Objectives of the Policy

- To provide a policy framework for rapid and effective adoption of OSS

- To ensure strategic control in e-Governance applications and systems from a long-term perspective.

- To reduce the Total Cost of Ownership (TCO) of projects.

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Policy Statement

Government of India shall endeavor to adopt Open Source Software in all e-Governance systems implemented by various Government organizations, <u>as a preferred option</u> in comparison to Closed Source Software (CSS).

Infrastructure Tools

Open Stack	Server OS
Future cloud computing	CentOS, Ubuntu, Debian, BOSS
NGINX	**Apache ZooKeeper**
HTTP Server/IMAp/POP3 Proxy	Configuration management
ANSIBLE...	**Open NMS, Nagios...**
Data center orchestration	Network monitoring

App Development & Deployment

HTML, JavaScript, jQuery	Node.js, Express.js
Clientside Programming Language	Application Server
PostgreSQL, MariaDB, MySQL	React.js, Vue.js, Polymer.js, Ember.js, Bootstrap.js... C3.js, D3.js, dc.js ...
Relational Database	Client Side Framework
Apache CXF,Tomcat,Symfony	**CakePHP, Laravel, CodeIgnitor**
Web Service Framework	PHP Web Service framework

Introduction to Client-Side Developmenet

Mobile App Development, Data management, GIS, Devops

Apache cordova, Ionic, Android studio Mobile App development	**Map Server, Geo Server** GIS Server
Apache Maven, Gradle, Webpack Build Tool	Quantum GIS, GvSIG,GRASS GIS desktop
Tuleap, Jerrit, Jenkin DevOps	Apache Cassendra, Hbase, Hadoop, CouchDB Big Data

App Support

Eclipse, Netbeans, Visual studio IDE	**Moodle** e-learning
Git, Subversion Source Code Control	**Dspace** Digital Archiving
Libreoffice, Openoffice Documentation	Qunit, Junit, Jmeter, W3C Validator Testing

OSS Support Tools

Imaging Tools
Office productivity tools
Diagramming tools
Audio tools
Video tools
Antivirus
Education
Email
File Transfer
Games
2D/3D graphics software
Groupware
HTML editors
Image galleries
Instant messengers
Internet forum software
IRC clients
Learning support software
Mathematics software
Media players
Multimedia codecs, containers, and splitters

...

PDF software
Personal information managers
Project management software
Science software
Search engine software
Special purpose file systems
Spreadsheets
System software
Television software
TeX software
Text editors
Usenet clients
Version control software
Video software
VoIP software
Web browsers
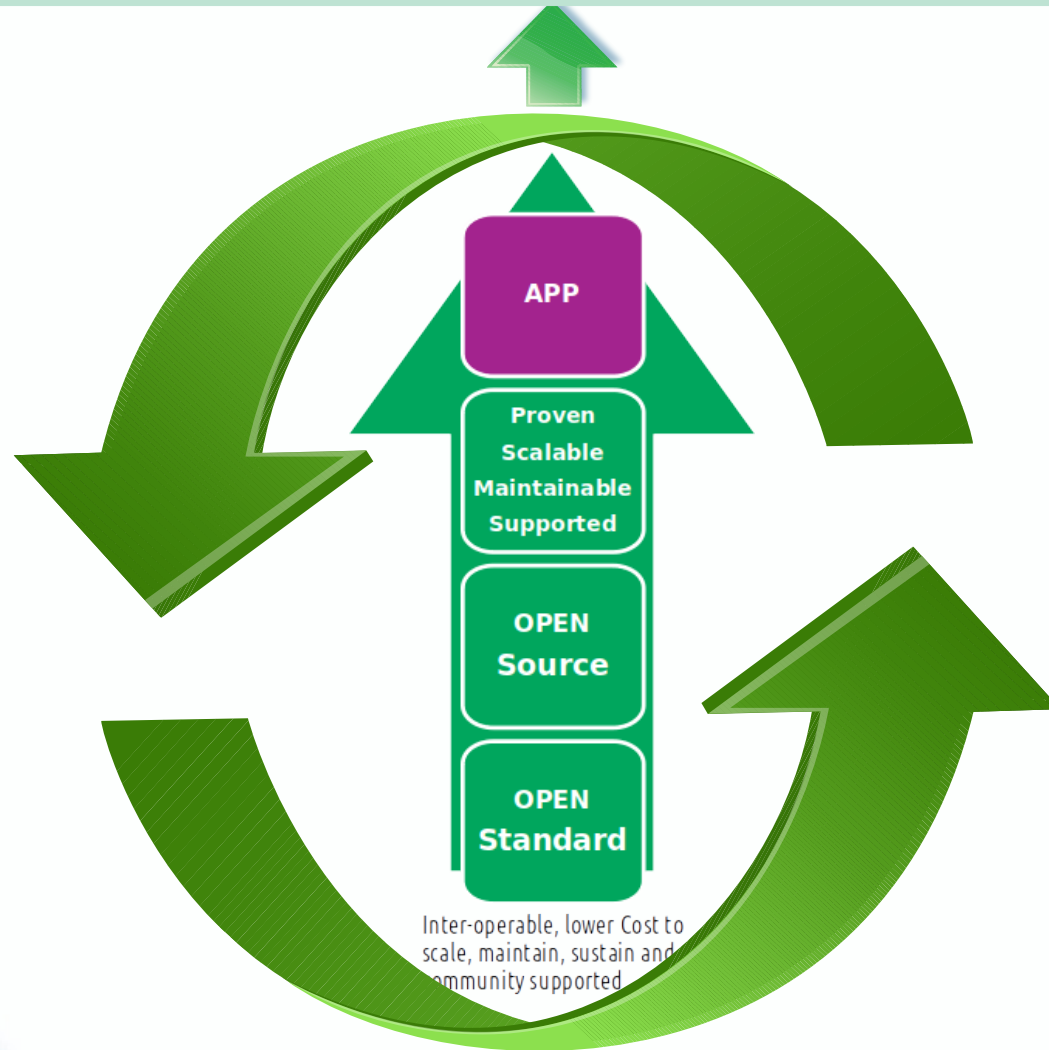Windowing systems
Word processors
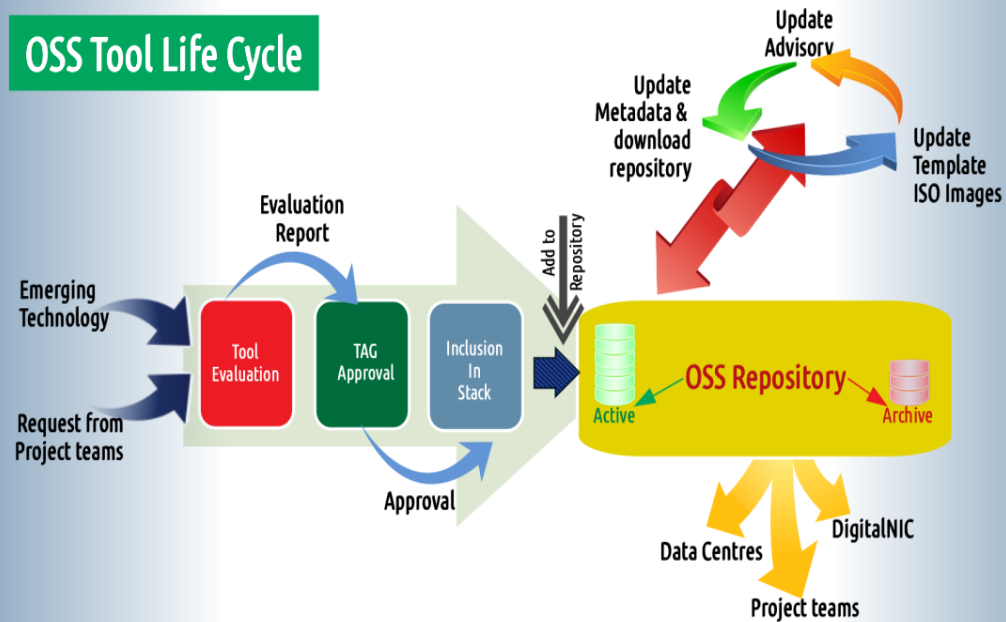X window managers

...

Towards NIC OSS REPO...

APP

Proven Scalable Maintainable Supported

OPEN Source

OPEN Standard

Inter-operable, lower Cost to scale, maintain, sustain and community supported

Inter-operable, high Cost to scale, maintain and sustain

APP

Proven Scalable Maintainable Supported

OPEN Source

OPEN Standard

No inter-operable, high Cost to scale, maintain and sustain

APP

Proven Scalable Maintainable Supported

OPEN Source

NOT OPEN Standard

No inter-operable, Very high Cost to scale, maintain, sustain and supported

APP

NOT OPEN Source

NOT OPEN Standard

NIC Open Source Software Repository

APP

Proven
Scalable
Maintainable
Supported

OPEN
Source

OPEN
Standard

Inter-operable, lower Cost to scale, maintain, sustain and community supported

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NIC Open Source Software Tool Life Cycle

Tools approved as per the OSS Stack are already available. New tool can be evaluated by the project teams/OTG and submitted to TAG for inclusion in the Stack

OSS Tool Life Cycle

Emerging Technology

Request from Project teams

Evaluation Report

Tool Evaluation

TAG Approval

Inclusion In Stack

Approval

Add to Repository

Update Advisory

Update Metadata & download repository

Update Template ISO Images

OSS Repository

Active

Archive

Data Centres

DigitalNIC

Project teams

Metadata updation and downloads are continuous processes which involve referring community site for updates/ upgrades/ end of life/ license check/ release notes analysis etc.

NIC Open Source Software Repository

- Evaluate and Recommend the open source software for e-Governance Solutions.

- Maintain Distribution Repository of recommended open source software for usage across NIC.

- Guide and handhold NIC teams in keeping their open source driven system secure.

- Training on Open Source Software.

- Oversight of open source Infrastructure across NIC with respect to Cyber Security

Open Source Software Repository

Evaluate and Recommend ~ OSS Survey 2017-18 Themes

- OSS vs Non OSS
- App Server Statistics
- Web Server Statistics
- Operating System Statistics
- Programming Language
- Portal/ CMS Statistics
- Web Application Statistics
- Integrated Development Environment
- Database Statistics
- Critical Performance Analysis
- Mobile App Analysis

Open Source Software Repository

Evaluate and Recommend ~ OSS Survey 2017-18

OSS Adoption Growth during 2015-2018

Domain	OSS%		OSS Adoption Growth %
	2015-16 Survey	2017-18 Survey	
Server OS	28.32%	35.20%	6.88%
Database	35.93%	50.17%	14.24%
Web Server	30.74%	48.18%	17.44%
App Server	22.93%	46.74%	23.80%
Prog. Language	33.40%	61.31%	27.90%

Domain	Non-OSS %	
	2015-16 Survey	2017-18 Survey
Server OS	71.68%	64.80%
Database	64.07%	49.83%
Web Server	69.26%	51.82%
App Server	77.07%	53.26%
Prog. Language	66.60%	38.69%
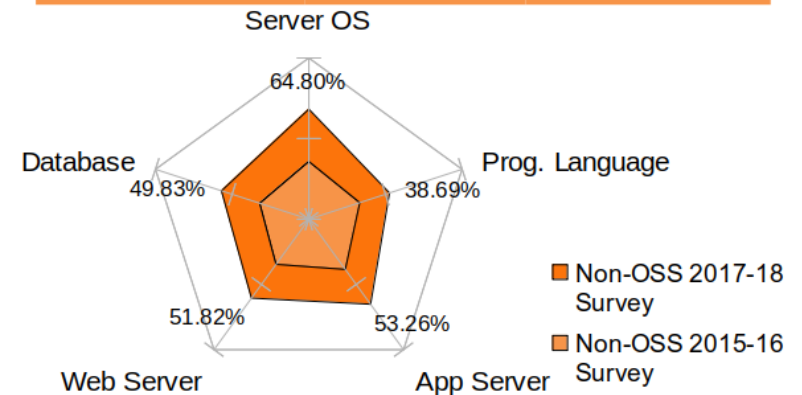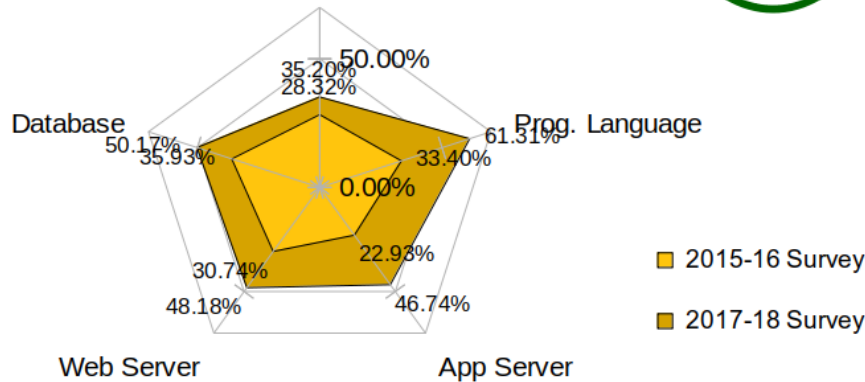
The percentage of adoption increased after the announcement of "Policy on Adoption of OSS for GoI" in 2015 and growth in all domains including Programming Languages, Application Server, Web Server, Database and Server OS.

OSS National Survey Results (Dec 2017 – Mar 2018)

Open Source Software Repository
Evaluate and Recommend ~ OSS Survey 2017-18

State-wise OSS adoption in atleast one domain

State	OSS*	State	OSS*
Andaman & Nicobar	16	Maharashtra	15
Andhra Pradesh	11	Manipur	1
Arunachal Pradesh	9	Meghalaya	9
Chandigarh	1	Nagaland	1
Chhattisgarh	21	Odisha	11
Delhi	32	Puducherry	8
Goa	5	Punjab	1
Gujarat	1	Rajasthan	5
Haryana	4	Sikkim	3
Himachal Pradesh	4	Tamil Nadu	65
Jharkhand	1	Telangana	12
Karnataka	5	Tripura	12
Kerala	20	Uttar Pradesh	10
Lakshadweep	4	Uttarakhand	
Madhya Pradesh	9	West Bengal	4

SPREAD OF OSS ACROSS COUNTRY

Legend
state_shf
OSS
- 1 - 5
- 6 - 12
- 13 - 21
- 22 - 32
- 33 - 65
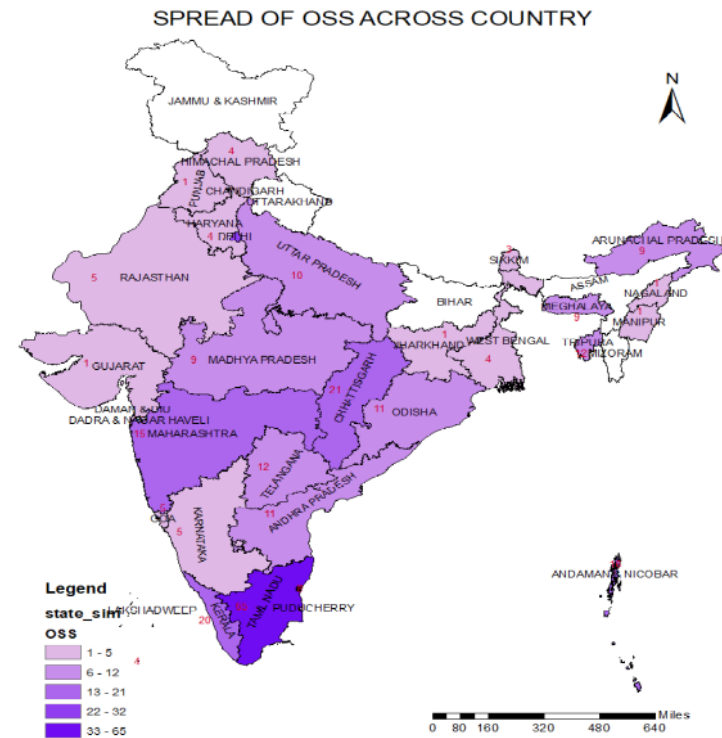
OSS adoption is significant in Tamil Nadu, Delhi, Chhattisgarh, Kerala, Andaman & Nicobar, Maharashtra, Telugana, Tripura, Andra Presdesh, Odisha and Uttar Pradesh.

OSS National Survey Results (Dec 2017 – Mar 2018)

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Evaluate and Recommend ~ OSS Survey 2017-18

Portal / CMS Statistics

CMS	Nos	%
Drupal	26	40.00%
Joomla	3	4.62%
Zope Plone	6	9.23%
Altitude	4	6.15%
Jadu	1	1.54%
MS SharPoint	2	3.08%
Wordpress	6	9.23%
Oracle WebLogic	1	1.54%
Inhouse Developed	16	24.62%

Legend:
- Drupal
- Joomla
- Zope Plone
- Altitude
- Jadu
- MS SharPoint
- Wordpress
- Oracle WebLogic
- Inhouse Developed
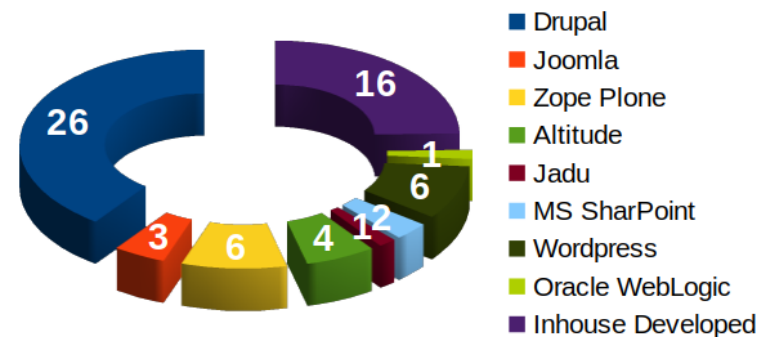
Capacity building on Drupal and Wordpress CMS to be enabled through Online, Workshops and Class Room sessions.

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Open Source Software Repository
Evaluate and Recommend ~ OSS Survey 2017-18

State-wise DB Analysis

OSS National Survey Results (Dec 2017 – Mar 2018)

SR-Streaming Replication
RQ-Read Query
PT-Performance tuning
AP-Archival Policy
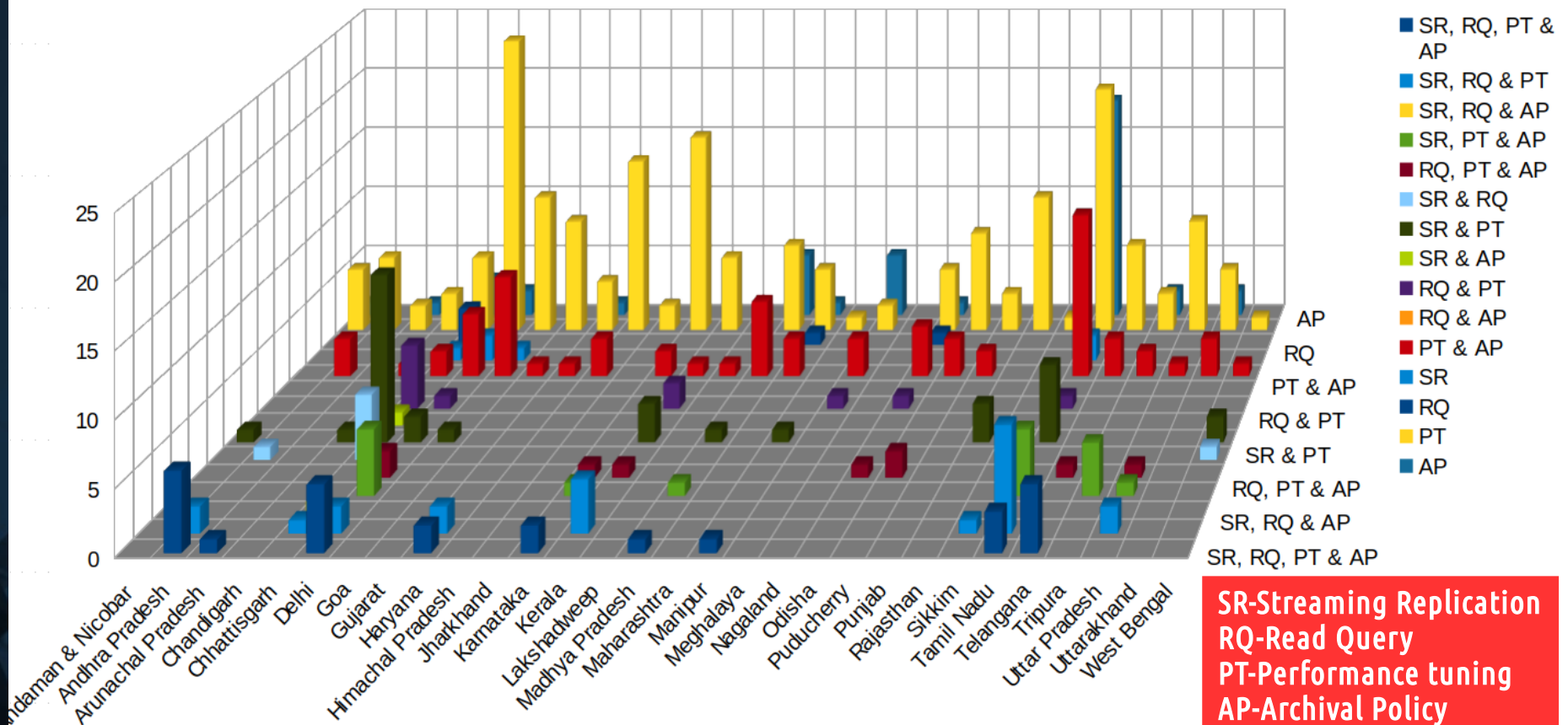
Critical project should have the compliance of all 4 in order to keep performance and storage to optimum level and to ensure availability.

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Open Source Software Repository
Evaluate and Recommend ~ Tool evaluation

NATIONAL INFORMATICS CENTRE
NIC, A-Wing, Rajaji Bhawan, Besant Nagar, Chennai – 600 090

Summary Information

Sl. No	Criteria	Applicability (0-No 1-Yes)	Score (in the scale of 0-5)	Evaluation Parameters	Observations
1	Roadmap	1	4	Longevity - Latest version & Release Date Longevity - Date of Previous Release (Before Latest Versi Longevity - First Release & Age of the Product	3.a 3.b 3.c
2	Reputation	1	4	Community - Number of posts and users Community - Quality of reply & Response time Release Activity - Number of releases per year Longevity - Latest version & Release Date Longevity - First Release & Age of the Product Longevity - Repository detail	1.d 1.e 2.a 3.a 3.c 3.f
3	Standards	1	3	Integration - Standards	13.b
4	Support (Community)	1	4	Community - Discussion Forum / Mailing List Community - Friendliness Longevity - First Release & Age of the Product Longevity - Total Number of Releases Longevity - Repository detail Does the product has Community edition ? Support - Community Support	1.c 1.f 3.c 3.e 3.f 7 9.a
5	Support (Commercial	1	0	Does the product has enterprise edition Support - Paid support Support - Vendor / Third party	8 9.b 9.c
6	Documentation	1	4	Documentation - User Documentation available ? Documentation - Developer Documentation available ? Documentation - Maintainer Documentation available ? Documentation - Is it up to date ? Documentation - Books Available ?	10.a 10.b 10.c 10.d 10.e
7	Maintainability	1	4	Release Activity - Significance – security/feature/major/min Longevity - Latest version & Release Date Longevity - Date of Previous Release (Before Latest Versi Longevity - First Release & Age of the Product	2.b 3.a 3.b 3.c
8	Scalability	1	2.7	Functionality - Feature List Functionality - Limitations DevOps details - Is the product is available as Container	12.a 12.b 14.a
9	Usability	1	2.7	Functionality - Feature List Functionality - Limitations DevOps details - Is the product is available as Container	12.a 12.b 14.a
10	Security	1	3.7	Release Activity - Number of releases per year Support - Failure Support (Bug Tracker) Security (how many security vulnerability patches were rele	2.b 9.d 11
11	Interoperability	1	3.2	Platform availability Cross Platform Compatibility Integration - Modularity Integration - Collaboration with other products DevOps details - Is the product is available as Container	4 5 13.a 13.c 14.a
12	Skill set	1	3	NIC Resources	18
13	License	1	3	License Does the product has Community edition ? Does the product has enterprise edition	6 7 8
	Total	**13**	**41.3**		
	Average Score		**3.2**		
	Recommended for OSS Stack Inclusion :			**Yes**	

Software Release Cycle of OSS Tools

- **Varied Choices**
  - LTS Releases
    - Long term committed community Support
  - End of Life Announcements
    - New protocols
    - Non availability of contributors
- **Understanding the process followed for each tool is essential for meta-data collection.**
  - Key Challenge : No uniform process or coding convention adopted
  - But tools usually have a Release Policy or Version Policy

- **Release Policy**
  - Version Numbering System
  - Schedule Details
  - LTS Information
  - End of Life Announcements
  - Update and Upgrade Requirements
- **Every release has a release notes**

Open Source Software Repository

Open Source Software Stack – Functional domains

- Programming Language Client-side
- Relational Database
- Web / HTTP Server
- Programming Language Server-side and Library
- Server Side Framework
- Application Server
- Client-side Framework
- Server Operating system
- Portal/CMS
- GIS Desktop

- Non-Relational Database (Big Data)
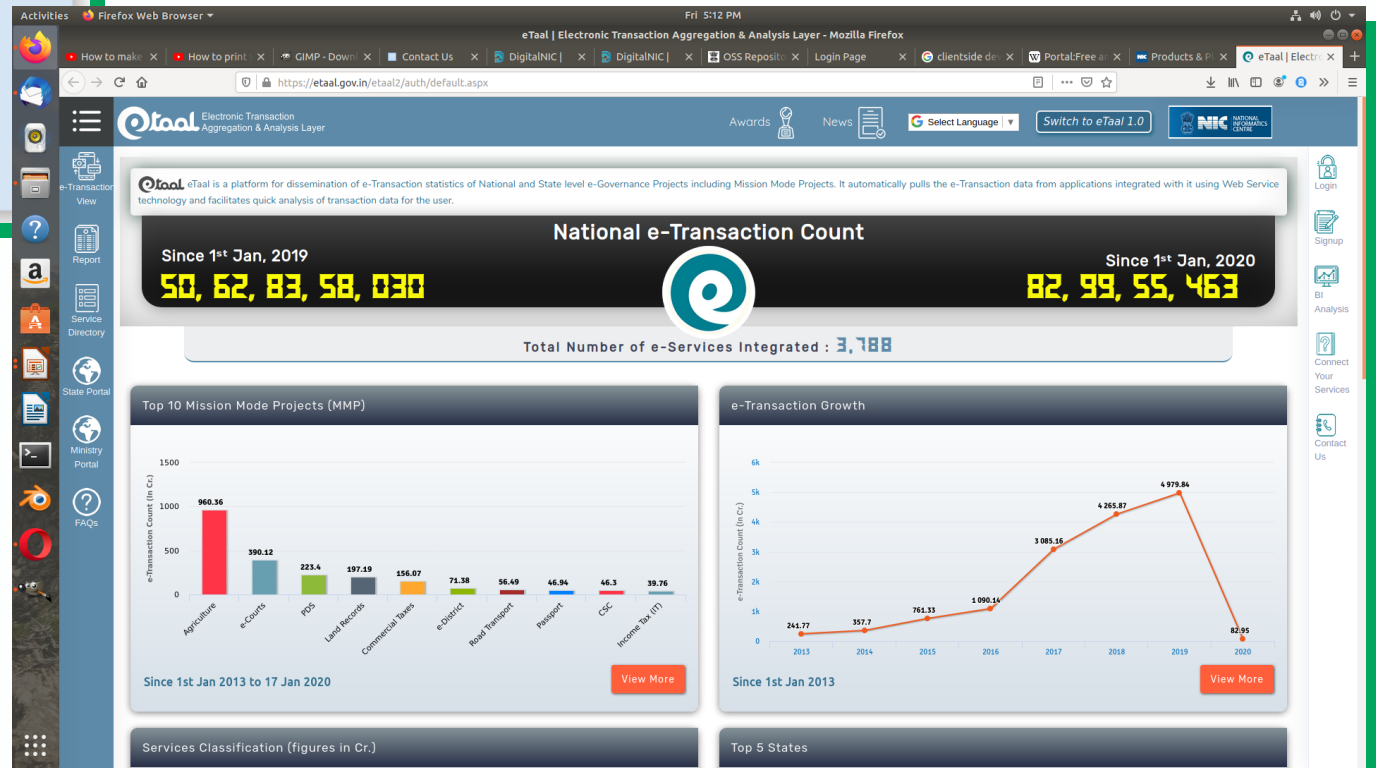
Open Source Software Stack based Apps...

NIC OSS Products & Services

eTaal

An aggregated view of e-Transactions performed through eGovernance applications

View more

NIC OSS Products & Services

Service Plus

Making all Government services accessible to the common man

View more

NIC OSS Products & Services

National Scholarships Portal

One-stop solution for scholarship process

View more

NIC OSS Products & Services

eCourts

Transparent, accessible and cost effective Justice delivery system

View more

NIC OSS Products & Services

Open Government Data (OGD) Platform, India

Transparency in Government functioning

View more

NIC OSS Products & Services

NIC OSS Products & Services

e-Hospital

Simplifying Healthcare Service Delivery

View more

NIC OSS Products & Services

e-Office

A Digital Workplace Solution for
all government employees

View more

NIC OSS Products & Services

Government e-Procurement System

Simplifying government procurement/tendering system

View more

Change over to Open Source

Domain distribution on Server Operating Systems

	Non-OSS Operating System	OSS Operating System	
Web Server	34	198	OSS Domains
App Server	35	193	
Database	41	183	
Prog.Language	90	208	
Web Server	300	8	Non-OSS Domains
App Server	293	8	
Database	272	18	
Prog.Language	298	1	

OSS Domains on Non-OSS Operating System

36.67% 36.48% 35.60% 55.56%

15.08%

7.98% 6.62% 6.30%

OSS Domains on OSS Operating System

1.48% 1.51% 3.5% 0.17%

Non-OSS Domains on Non-OSS Operating System

49.92%

52.92%

55.39%

55.56%

Non-OSS Domains on OSS Operating System

Web Server   App Server   Database   Prog Language

OSS National Survey Results (Dec 2017 – Mar 2018)
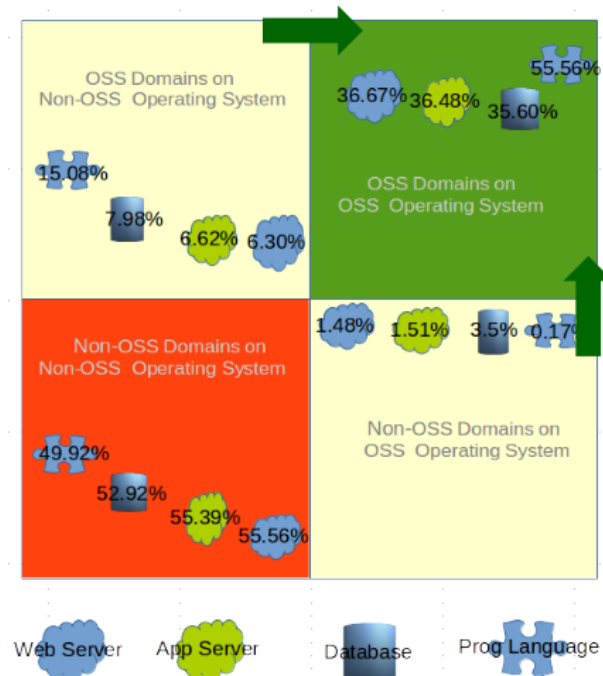
The Non-OSS Server Operating Systems need to plan for migration to the Open Source Operating System as per OSS Policy. Necessary Capacity building programmes to be planned.

Hype Cycle for Open-Source Software, 2019

Open Source Software future adoption

T — Augmented Analytics, Augmented intelleigence, Blockchain, Devops Toolchain, Event stream processing, Machine Learning, Serverless infratsructure ...

H — Agile Aps, AI Toolkits, Computer vision, Container management, Continuous software deployment, IaaS, Software defined Infrastructure, In-Memory data Grids..

M — Agile architecture, Cloud native app architecture,Python, Serverless Pass, Spark, open POWER
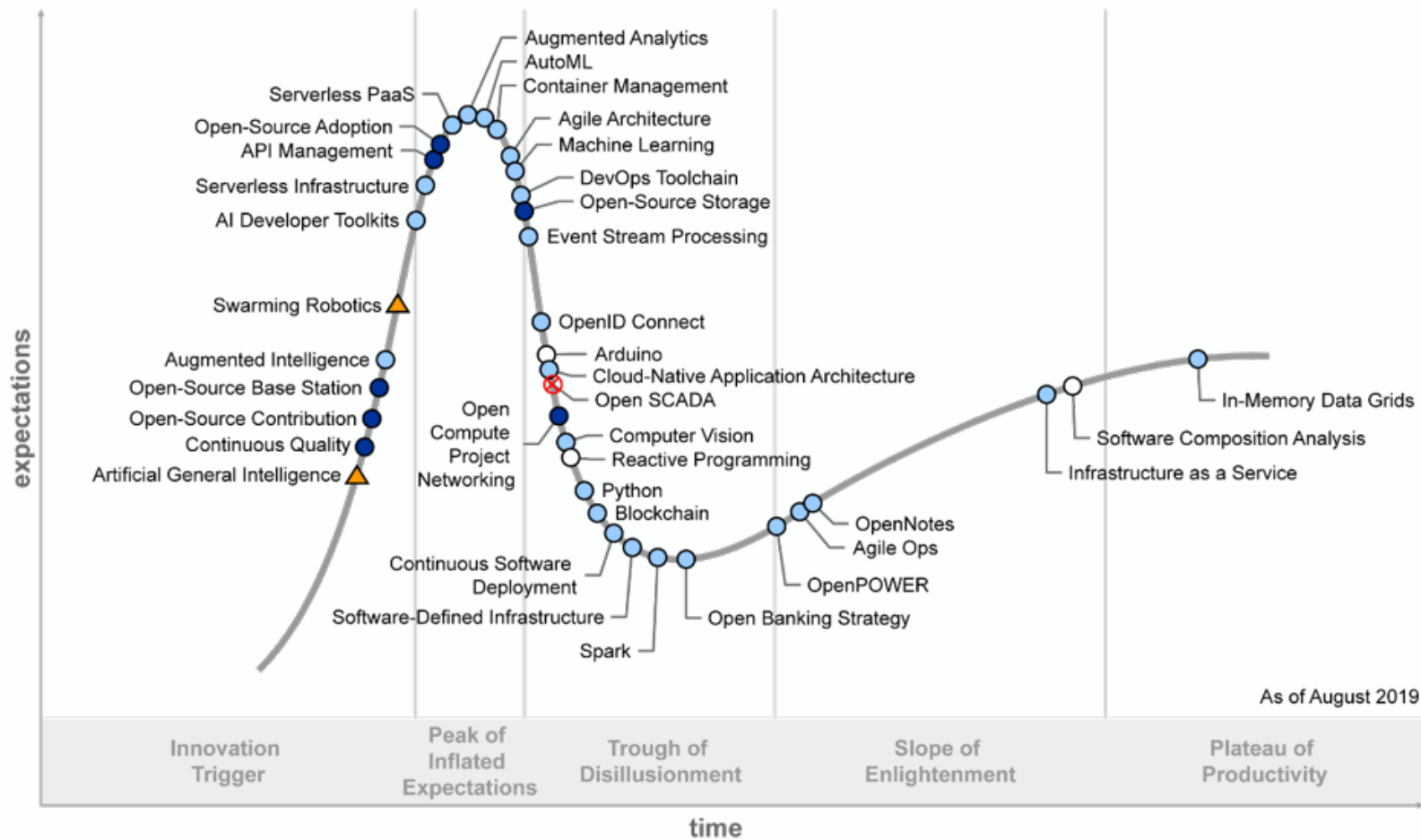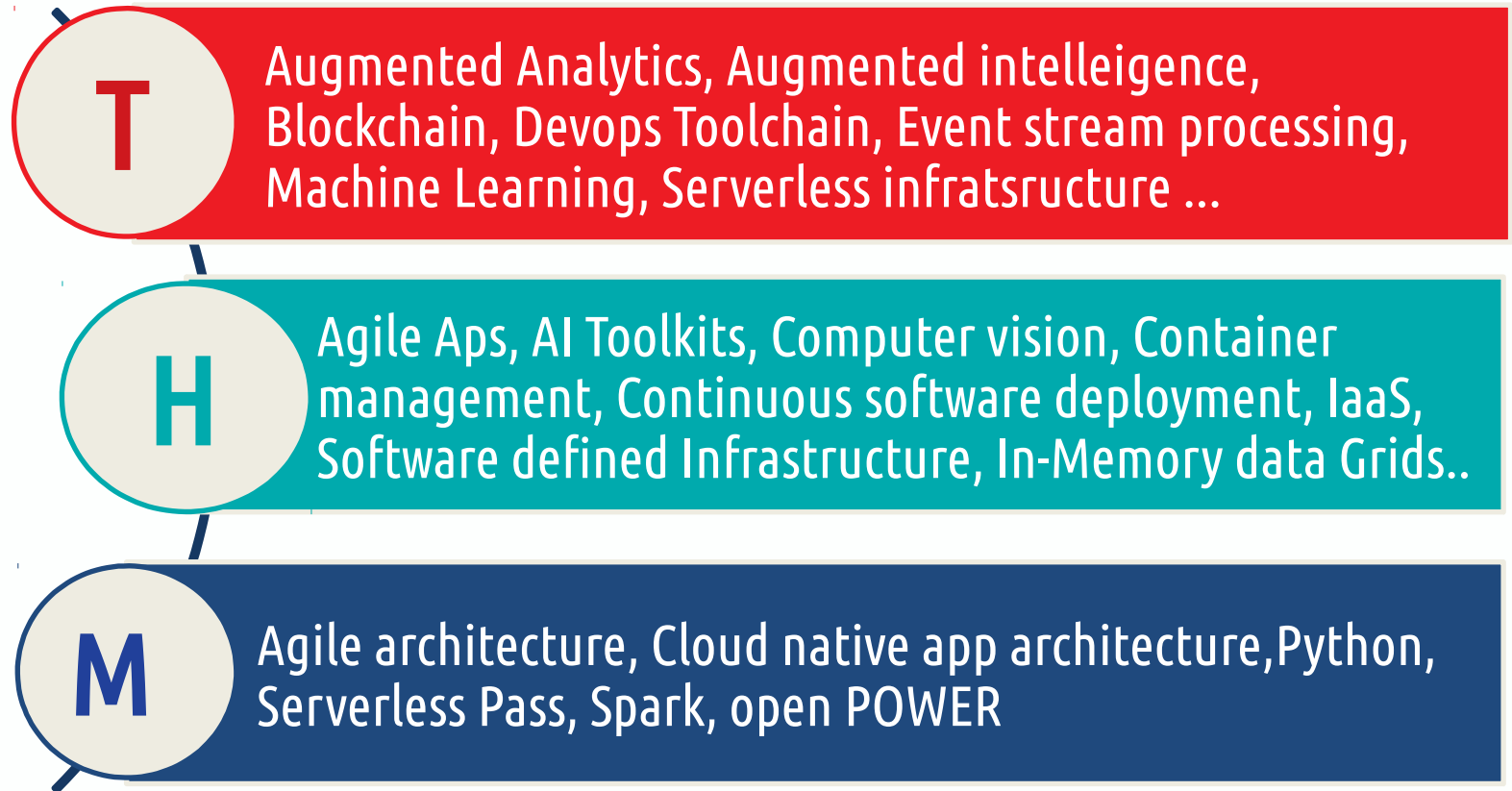
Data: Gartner 2019

T Transformational **H** High **M** Moderate

Open Source Software future adoption

DevOps is the collaboration of constantly delivering high-quality software that solves customer challenges with people, process and tools
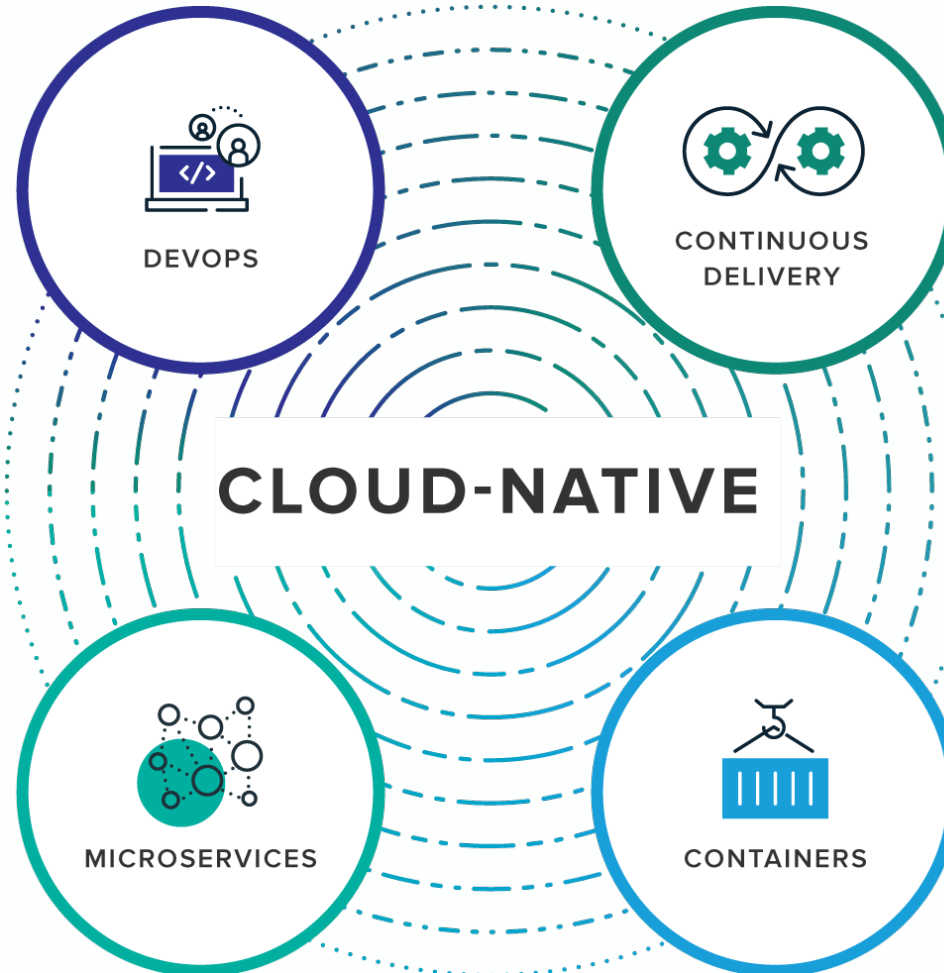
shipping small batches of software to production constantly, through automation

DEVOPS

CONTINUOUS DELIVERY

CLOUD-NATIVE

MICROSERVICES

CONTAINERS

single OS instance is dynamically divided among one or more isolated containers, each with a unique writable file

Microservices is an architectural approach to developing an application as a collection of small services. Each microservice can be deployed, upgraded, scaled, and restarted

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Open Source Software future adoption

Traditional Enterprise Apps	Cloud Native Apps using openstack and OSS tools
Unpredictable	Predictable (highly automated container driven)
OS dependent	OS abstraction (team focus on software)
Over-sized capacity	Right-sized capacity (infrastructure provisioning)
Siloed	Collaborative (Devops)
Waterfall (time consuming SDLC)	Continuous delivery (agile, continuous)
Dependent (single deploy with dependencies)	Independent (small loosely coupled Microservices)
Manual scaling (Manual server, network, storage mgt)	Automated scaling (automated)
Slow recovery (VM based)	Rapid recovery (Container Based)

Thank You

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