Building the VOLTTRON Community: Expanding Transactive Energy in Buildings of all Scales

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What is a Technology Community?

▶ A voluntary association of skilled professionals looking to develop or advance a specific technology or an aspect of it

▶ Could be as small as a handful of members or include millions

- Oracle Technology Network Community

▶ Function by offering a venue where participants can interact, develop new content or material, share knowledge, provide feedback, and help with problem solving skills

▶ Have advantage of

- Access to wide range of knowledge

- Pool intellectual assets and skill sets

- Solve intricate problems that require brain power of many individuals

Examples of Technology Communities

► The Eclipse Project

- Enables collaboration on commercially-friendly open source software
- Created by IBM in November 2001; focus on vendor neutrality and transparency

► The Scrum Alliance

- Supports adoption and practice of Scrum, a process management tool
- Goal to deliver products (mainly software) in very short turnaround times (between 2 and 4 weeks)

► The Wi-Fi Alliance®

- Goal to provide collaboration forum to grow the Wi-Fi industry, deliver product connectivity
- Certification organization for Wi-Fi label for 802.11-based devices that conform to certain standards of interoperability.

► Better Buildings Alliance

- Goal to increase energy efficiency in U.S. commercial buildings
- DOE driven community brought together in 2009 including members from various commercial building sectors

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Structure and Decision Making

▶ Completely Flat Hierarchy
- Every member has an equal amount of decision making power and access to source material, such as software codes or technology designs that are being developed or improved

▶ An Elected Leadership Circle
- "Board of directors" with certain privileges in the areas of access to vital source information, or decision making

▶ Stewarded by an Elected or Self-appointed Leader
- "Benevolent dictatorship" leading the community towards the development of a successful product

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Overview of Leadership Styles and Openness of Technology Communities
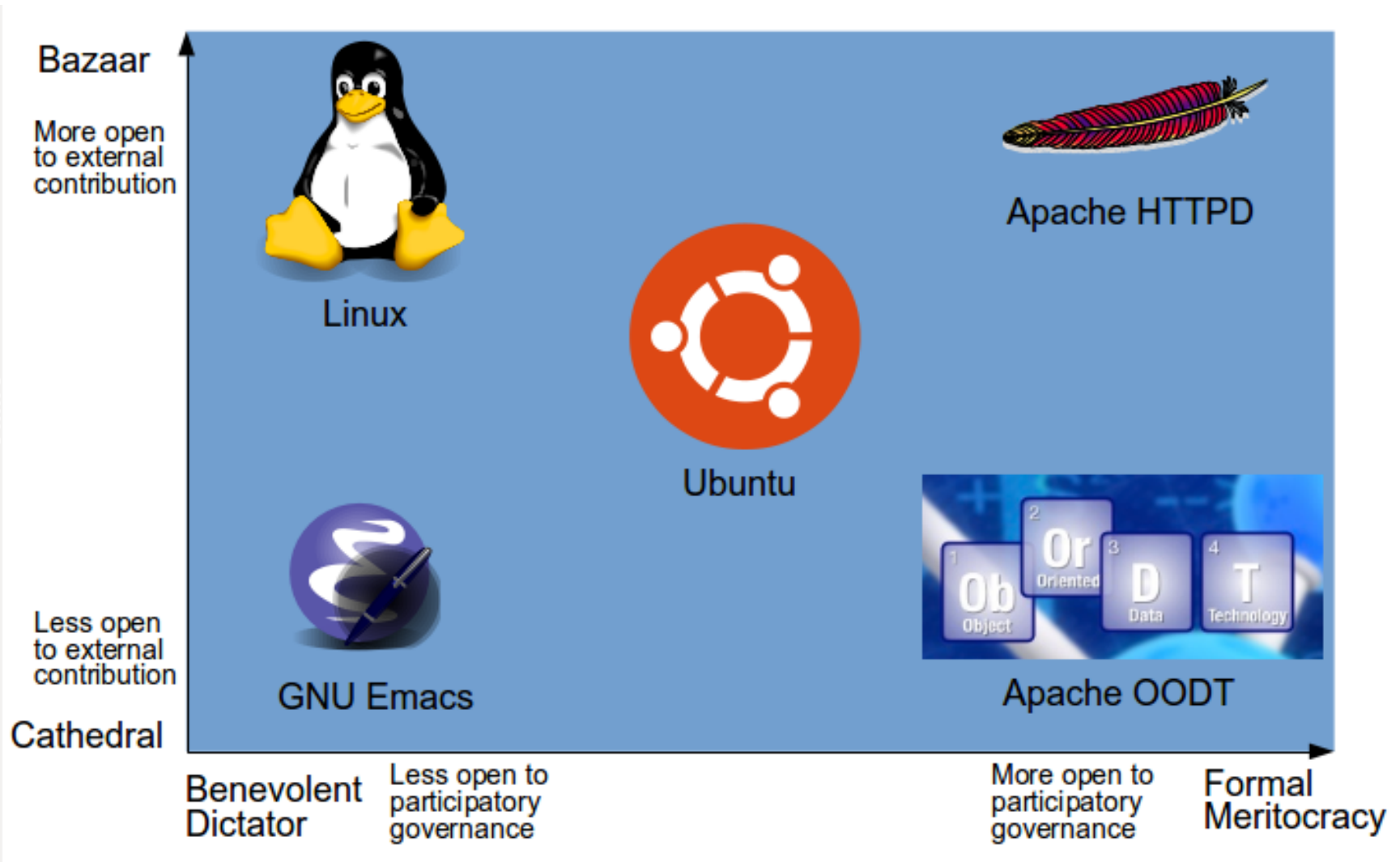
(Source: OSS Watch)

Building a Technology Community

▶ Founder should appeal to prospective members

▶ Membership should ideally be free and participation should be open

- ■ "One-company, one-vote" principle, like most communities do

▶ Draw members with the challenge of the unsolved

- ■ Transactive energy is big and complicated!

▶ Set clear expectations

▶ Division of labor

▶ Leadership and decision making model

▶ Clear timelines and milestones

- ■ Go, no-go decisions

▶ Intellectual property rights of the community's work

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Forming a Community for Transactive Energy for Buildings

▶ Clearly explain what transactive energy for buildings is all about

▶ Lay out the benefits of transactive energy for buildings

- Efficiency gains resulting from a more efficient execution of asset and load control strategies

- Better understanding of buildings' energy portfolio, state of equipment

- Improved better asset utilization and reduced operation and maintenance costs

- Reduced stress on generation, transmission, and local distribution systems

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Desired Outcomes for the Transactive Energy (TE) Community

► A catalog of real-world TE applications related to buildings

► A reference TE platform supported by the community participants

► TE applications developed on the reference TE platform for demonstration purposes.

► An interoperability testing and certification suite to ensure multi-vendor interoperability

► Multiple demonstration facilities to help evangelize TE applications for buildings

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Desired Outcomes for the Transactive Energy (TE) Community

▶ A software repository to store TE applications, the reference platform and test suites, and an associated bug tracking and enhancement request

▶ A peer to peer technical support forum for fostering discussions and answering questions

▶ How-to documents to help build various TE applications on commonly encountered and readily available hardware

▶ A forum to track and discuss bugs, enhancements of the TE platform and the various applications

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What is a Technology Community?

Desired Outcomes

Initial Actions for the Community

Immediate Needs

An Example Community

Summary and Questions

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Action 1- Enhance the Reference Platform: VOLTTRON

▶ Allow researchers to focus on writing applications

▶ Serve as an integration point with vendors

▶ Lay out examples for future development

▶ Function as central portal for keeping track of platform enhancements

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Action 2- Organize Technology Challenge/Contest

► Stimulate the growth of the community by allowing a structured way for interested researchers to explore the platform while solving realistic problems

► Create awareness and encourage deployment

► Examples:

  ■ VAST Challenge (part of VisWeek) provides a data set to contestants who then use their tools and techniques to discover a hidden threat and produce a report

  ■ MGCP Interop events held in the early 2000s. This brought together a diverse set of vendors in a neutral environment to perform interoperability testing

► Possible locales:

  ■ PNNL Smart Homes

  ■ NREL ESIF

  ■ LBNL Flex Labs

  ■ ORNL BTRIC User Facility

  ■ Other …

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Action 3 - Produce Tests and Metrics for Interoperability

- ► Ensure the interoperability of projects produced by its members
- ► Establish procedures for certification testing
- ► Identify key standards that are part of transactive energy in buildings
- ► Describe gaps in standardization
- ► Engage appliance vendors and their testing experience/capabilities

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Presentation Outline

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Immediate Needs

▶ A website that functions as the venue for members to communicate with each other, as well as informing non-members of the nature and status of the project. The website can also be the portal used to store and present the work of the community

▶ A developer mailing list for the ongoing exchange of ideas, design and information that furthers communication between members

▶ A sort of version control that allows leaders and members of the community to see what changes to the product were made at what time, reference versions accordingly, and allow all members to be working on the most accurate and up to date product

▶ An issue tracker that lists and ranks work schedules and current activities, and allows planning and communicating what the current needs and tasks are

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GridLab-D: Grid Analytics Association

▶ Recently GridLab-D, another open source software initially developed by PNNL and later enhanced with DOE funding, created a technology community

▶ Enlisted an organization to lead the effort

▶ Articles of incorporation

▶ Vision, mission and purpose

▶ Polices and operating guidelines

▶ Antitrust policy

▶ Membership agreement

▶ Budget and dues

▶ Record retention policy

▶ Whistleblower policy

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GridLab-D: Grid Analytics Association Organization

▶ Operations – organization and operation of the association

▶ Development – recruits members, raises funds

▶ Research – research priorities through discussions with members and users

▶ Outreach – promotes the association

▶ Education – promotes and executes training and the use of GridLab-D

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Summary

▶ Transactive energy community will be created

▶ What structure should the community adopt – "Benevolent Dictator and Cathedral" or "Formal Meritocracy and Bazaar" or somewhere in between?

▶ Who else should be part of the community?

▶ Where do we go from here? How do we build the community?

Questions?

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VOLTTRON - https://transactionalnetwork.org/
http://github.com/volttron

PNNL Developed Applications (Transactional Network)

Smart Monitoring and Diagnostic System -
http://buildingsystems.pnnl.gov/building/smds.stm

Proactive Diagnostics -
http://buildingsystems.pnnl.gov/building/afdd.stm

Automated Demand Response -
http://buildingsystems.pnnl.gov/building/adr.stm

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