PlanIT OS Architecture

January 27th, 2013
Today’s Context and Challenges (1 of 2)

Today’s Architecture Context

Today’s Context challenges

- Closed and Proprietary Supervisory and Controls Protocols
- No API or Proprietary Application API
- Legacy and Proprietary Sensor and Actuator Network
- Embedded Apps/Sensors/Actuators are difficult to leverage and cause significant data holes in today’s data
- Data is not naturally aligned in terms of time and location. This inhibits sophisticated pattern detection
- Overall complexity is expensive to maintain and difficult to upgrade, resulting in static environments that show a lack of agility
- Hardware dependencies make it hard to leverage and port functionality
- Multitude of Single Points of Failure impact availability and reliability
Today`s Context and Challenges (2 of 2)

**Tomorrow`s Architecture Context**

- Exploding number of Applications
- Closed & Proprietary Supervisory & Controls Protocols
- Exploding number of Sensors & Actuators

**Tomorrow`s Context challenges**

- Internet based Sensor and Actuator Network (Internet of Things)
- Demand to mash-up Sensor & Actuator Data
- Lack of deployment flexibility makes it difficult to scale to large domains
- Infrastructure complexity is passed thru to apps, and results in lack of consistency and integration across apps
- Lack of consistent Application API makes it difficult to attract 3rd party eco system
- High cost of System Integration (SI) results in expensive and non scalable architecture and increases time to market
- Patchwork approach adds delays and complicates any Real Time Control
- Impossible to prevent cyber attacks against the infrastructure and data sources.
Industrialization of the internet – M2M Converges

Context of industrialization

- The Internet has evolved from simple information sharing, through communication and collaboration and now entering the era of ubiquitous connected devices.
- These devices are converging with the very fabric of our urban and natural environments. These may be simple sensors or actuators, materials, mobile devices such as smart phones, wearable or embedded medical appliances, complex machines such as unmanned aerial and ground vehicles and robots.
- Complex control systems are commoditized and replaced by a ubiquitous, industrialized network that provides real time sensing, control, spatial analytics, data integration, security, application development and provisioning of context relevant services for Machine to Machine (“M2M”), Internet of Things (“IOT”) and Collaborative Objects (“CO”) communication.
- Resulting infrastructure produces mass commoditization, reduction in costs, time and waste while increasing, by an order of magnitude, control & automation, breadth and depth of data (“Big Data”), the accuracy and scope sensing and analytics with near real time / real time application of results.

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Internet of things
PlanIT OS™ Solution / Value Proposition

- Ability to utilize standard hardware and software components
- Centralized management and distributed execution that allow to scale to large domains
- Common data and common analytics throughout a central stack drive the power of deeper insight
- Comprehensive Service Oriented Architecture API + 3rd party eco system
- Significant reduction of System Integration (SI) costs results in breakthrough Return On Investment (ROI)
- Agile environment that is easy to upgrade and that leverages historical data to improve forecasting and prediction
- Integrated and proven Real Time Control
- Portable applications and built-in hardware abstraction
- Flexibility in deployment results in progressively more efficient operations and lower operating costs
- Hardened support of legacy systems facilitates evolution vs. revolution and assures investment protection
- Highly redundant architecture that eliminates single points of failure
### PlanIT OS™ Platform

![PlanIT OS Image]

**PlanIT OS™** - is our standards based middleware product that provides real time sensing, control, spatial analytics, data integration, security, and support and provisioning of ubiquitous context relevant applications, known as PlaceApps ("**PlaceApps**") for the machine to machine ("**M2M**"), Internet of Things ("**IOT**") and Collaborative Objects ("**CO**") markets.

Note that M2M, IOT and CO can be used interchangeably.

### Platform Description
PlanIT OS™ Technology Architecture

Supervisory and Controls Layer

PlanIT OS Core (Supervisory Layer)
- Provides aggregated intelligence
- Designed for flexibility
- Scales from very small to very large implementations
- Supports local, cloud, and hybrid deployments and distributed, centralized, and hybrid architectures
- Provides supervisory for the Controls layer
- Ensures data propagation
- Adds spatial capabilities

PlanIT OS RTC (Controls Layer)
- Provides redundant infrastructure - Integration in Network or Embedded Appliance
- Designed to run the most time critical functions at the edge of the network
- Minimizes latency, maximizes performance, and isolates “chatty” info
PlanIT OS™ Technology Architecture

**Interfaces (1)**

**PlanIT API (Application Program Interface)**
- Service Oriented Architecture (SOA)
- Open Data Protocol (odata)
- RESTian web services (XML and JSON)
- SOAP and WS-I coming soon
- Support for http and https
- PlanIT SDK available

**PlanIT DSI (Distributed Scale Interface)**
- Internal interface to the PlanIT Middleware
- Interaction between controls and supervisory
- Distribution across multiple instances
- Provides extensible flexibility
- RESTian web services for low volume data
- Named pipe interface for bulk data

**PlanIT SCI (Sensor and Controls Interface)**
- Standard Protocols and Drivers
- Support for New Standards, Legacy Standards, and Proprietary Interfaces
- (Lighting Systems, Fire Systems
- PA, Audio, and TAPI systems
- CCTV systems, Security Systems
- BMS/ BEMS controllers
- Messaging and Paging Systems
- People Counting Systems / Car Park Systems
PlanIT OS™ Technology Architecture

Interfaces (2)

PlanIT EAI (External Asset Interface)
- PlanIT EAI (External Asset Interface) Integration of External Data Sources
- Integration with ERP and Billing solutions
- Supports XML-based data feeds
- with XSLT transformation
- and the ability to embed customized functions.
- More complex integration scenarios will be supported using the future BizTalk Server component
**Vertical Markets Solution – Urban Environments – PlanIT UOS**

- **Solutions** means commercial offerings developed by Living PlanIT, in collaboration with our Partners, for a market or markets that combines (i) technology and capital equipment; (ii) services such as consulting, maintenance, support, education and certification; (iii) services such as data network, processing, storage and operations; (iv) licensing, royalties, subscription, finance and leasing; channel for purchasing; (vi) media and communications; (vii) and / or some combination thereof.

- **PlanIT Da Vinci** or **Da Vinci** is our PlaceApp product providing the application, user interface components and supporting PlanIT OS services for spatial design, modeling, simulation, fabrication, maintenance, operations and decommissioning.

- **PlanIT Columbus** or **Columbus** is a class of PlanIT OS services and Da Vinci user interface components for supply chain management, supplier and contract management, purchasing, trading, transportation and logistics relating to the development, manufacturing, fabrication, operations, maintenance, decommissioning and recycling of complex capital assets such as buildings, infrastructure and equipment.

- **PlanIT Urban Operating System** or **UOS** is our standards based solution that incorporates the PlanIT OS (including Cloud, Network & Embedded Editions), Da Vinci, Columbus and legacy controls and management adapters for the design, simulation, fabrication, operations, maintenance and decommissioning of real estate and urban environments, facilitating the interaction between people, places and things.