WHITE PAPER

IS YOUR VOICE SOLUTION ENGINEERED FOR CHANGE?

How an Adaptive Voice Framework Improves Agility and Lowers Cost

voxware
The Voice Is Yours™

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Today's warehouse is a dynamic place where best-in-class enterprises continuously refine business processes in order to improve the competitive cost advantage they already enjoy. An increasing number have deployed voice technology and reaped the cost and customer service rewards that come from boosting worker performance.

But many paid a high price that only became evident as time passed.

Traditional voice systems for warehousing operations are "programmed point solutions" – customized software written specifically for a given situation. While the idea of a tailored solution "built to fit" seems attractive, there is a big downside: lack of flexibility and the cost of buying additional services from the voice vendor when changes are needed.

Unfortunately, the very technology that provides huge cost savings can become an anchor that inhibits what best-in-class enterprises need most: agility.

The solution – adaptive voice software – is easy to promise but difficult to deliver. This white paper discusses the five dimensions of adaptability that modern voice solutions must master. It will use the Voxware Adaptive Voice Framework as an example of how voice solutions are evolving to better meet the needs of modern enterprises.

Five Key Dimensions of Adaptability

Voice solutions quickly become a "way of life" in the warehouse. When they are inflexible and expensive to change, they hold the entire operation back. There can be multiple reasons for inflexibility in a voice solution. Any one will inhibit the organization and drive up cost. Examples are voice solutions that:

- Are so embedded with the WMS that they cannot be changed unless the WMS code is opened.
- Are programmed to operate on a specific device and cannot be ported to a different device without substantial time and/or cost.
- Are custom-coded and can only be changed via more programming.
- Offer no choice in IT deployment and management options.

These issues are not readily apparent when the voice solution is under evaluation. They usually arise after deployment, when the customer is already locked-in. To avoid getting caught with an inflexible voice solution, enterprises need to look for an "Adaptive Voice Framework," which must be pre-engineered for change across these five dimensions:

Five Dimensions of Voice Solution Adaptability

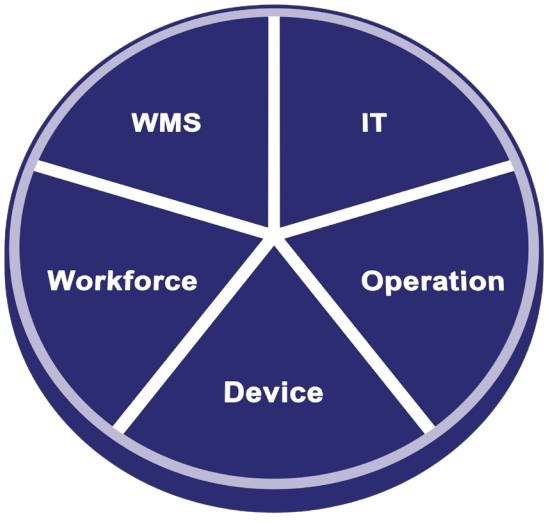


Figure 1

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1. Workforce
2. Operational Business Processes
3. WMS
4. Wearable Computer
5. IT Infrastructure

Voice solutions should adapt to the needs of the enterprise, not vice versa. By controlling these five dimensions, cost is minimized while agility is maximized.

Workforce Adaptability

The warehouse workforce is often a diverse group with widely varying experience and abilities. Sometimes many temporary workers are needed to support peak periods.

The most basic requirement for a successful voice deployment is for the workers to accept the system and be proficient with it. Recognition accuracy and responsiveness are key, but so is adaptability. A good voice solution must adapt to the individual worker – not only recognizing his or her speech regardless of language spoken, but also including performance enhancers targeted to the worker's skill and experience level.

If a voice solution fails, it's usually because the underlying voice recognition software cannot consistently catch what workers say. Recognition accuracy is fundamental to getting the ROI expected from voice. See our companion white paper – Voice in the Warehouse: Does the Recognizer Matter? – for a more complete discussion of the importance of the underlying voice recognition software.

To maximize workforce adaptability, you will want a voice recognizer that is speaker dependent, so it learns how each worker speaks, and "continuous" so it can support personal productivity enhancers. The Voxware Adaptive Voice Framework includes the Voxware Integrated Speech Engine (VISE), which has been refined over years to deliver near-perfect recognition accuracy no matter how diverse the workforce or how demanding the work environment.

Beyond recognition prowess VISE delivers continuous recognition technology. This enables capabilities such as "expert mode," in which voice solutions can be adapted to an individual worker's experience and ability (see Figure 2).

Adaptability to Workforce Skill and Experience

As workers gain skill and experience, they can begin using Expert Mode to reduce the number of interactions needed to complete a task.	
Normal Mode:	**Expert Mode:**
Prompt: Go to location 254 Response: "Check 782" Prompt: Pick 6 Response: "Grab 6" Prompt: Put 6 position Bravo Response: "Confirm Action"	Prompt: Location 254 Pick 6 Position Bravo Response: "782 Put 6 Bravo"

Figure 2

Operational Adaptability

Best Top-flight warehouse managers are problem-solvers. They often approach operational challenges from a "process" perspective, and solutions come in the form of business process changes. Even incremental improvements can translate into major savings and a strong bottom-line contribution.

The problem with traditional voice applications is that

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The VoxStudio Interface

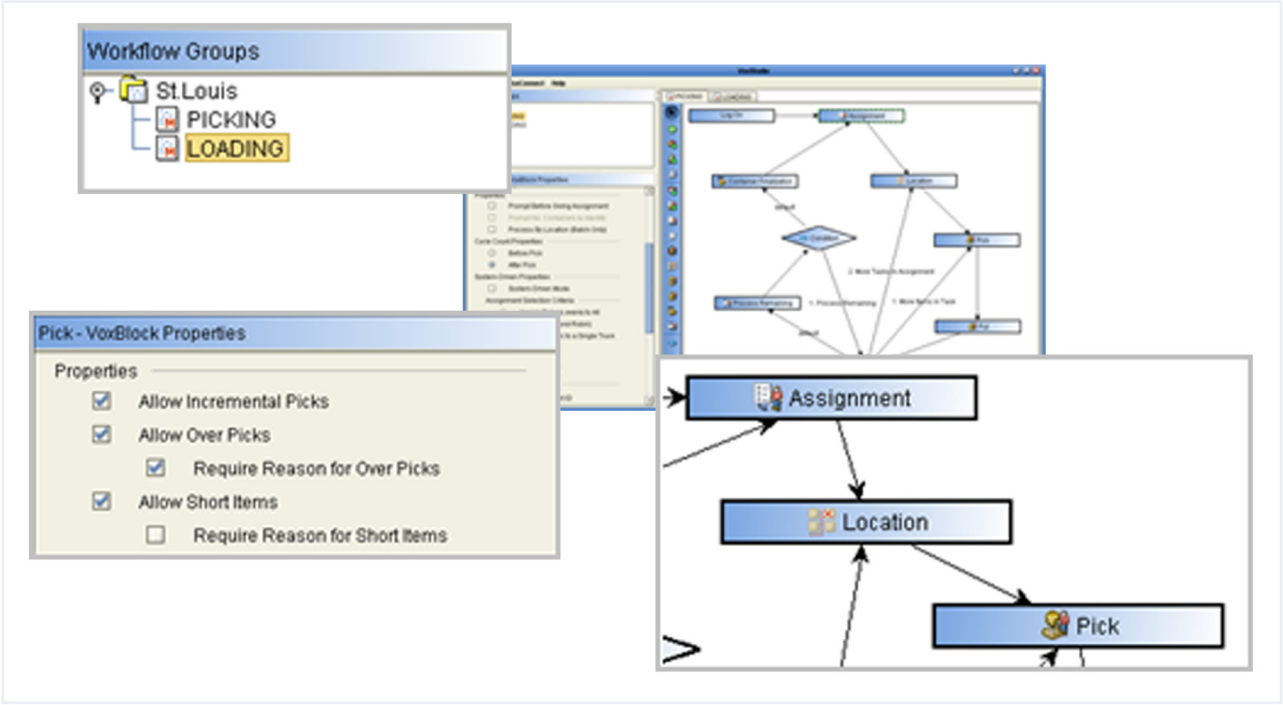


Figure 3

they are custom-programmed point solutions. Worse yet, some are created using a vendor-specific scripting language. Although options and switches may exist that make the coding process easier, these applications are not true software products but rather point solutions that can only be changed via programming.

Voice software must adaptive – so voice solutions can evolve in step with the operation and not hold it back. To achieve adaptability, two keys are needed:

- A graphical tool for diagramming voice solutions.
- A generalized interface that converts configuration options into open, standards-based voice solutions with pre-built prompts and responses.

VoxStudio delivers the first requirement (see Figure 3). Part of the Voxware Adaptive Voice Framework, VoxStudio enables business analysts to create voice solutions without programming.

With VoxStudio, the workflow of the voice solution is literally diagrammed, and options for WMS interaction, task steps, and user dialogs can be varied through on-screen selections. This not only eliminates most of the time and programming effort required to develop a voice solution – it reduces many business process changes to a simple re-configuration activity instead of a custom programming update.

The second requirement is satisfied by the Universal Voice Interface, part of the Voxware Adaptive Voice Framework that works in tandem with VoxStudio – taking the output from VoxStudio and creating the actual prompts and responses used by the worker.

The Universal Voice Interface is able to create virtually any voice business process (order picking, pick and pass, replenishment, loading, etc.), with many operational variations, from a relatively few VoxStudio building blocks.

Any voice solution can be tailored to a specific operation. But simply offering options doesn't mean the resulting solution is adaptable. In fact, most voice solutions today are still created the old-fashioned way, and are

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fixed upon customer acceptance. To get adaptability, you need software tools and an architecture that is engineered for change.

WMS Adaptability

To get the most out of voice, enterprises need to capitalize on the order fulfillment capabilities of their WMS. But they also need to make refinements to the voice solution without resorting to a costly project to modify the WMS.

the modern approach of enterprise application integration (EAI), in which software is loosely coupled yet effectively connected through a data or messaging-based interface motif.

One example of this approach is VoxConnect, Voxware's graphical integration tool (see Figure 4). By defining the messages and data to be interchanged between Voxware 3 and the WMS, voice solutions can adapt to the WMS without invasive programming. The result is faster deployment without compromising the ability to refine the voice business process in the future.

EAI-Style WMS Integration

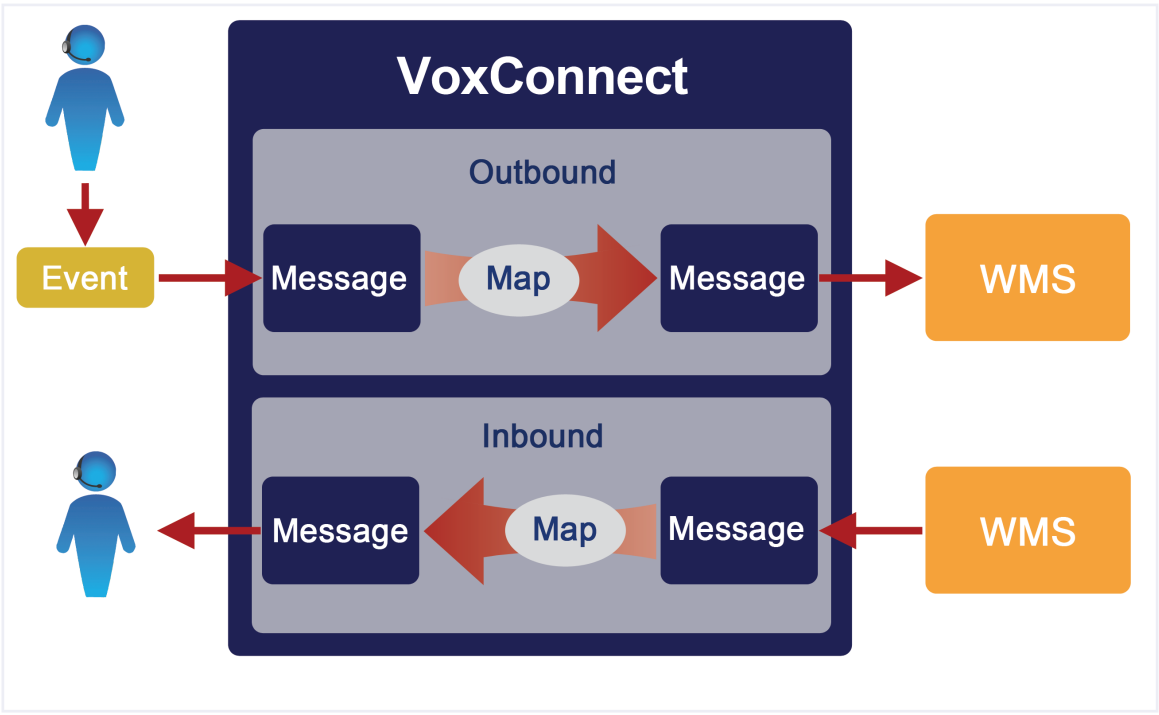


Figure 4

Voice software isn't very adaptive when WMS integration is hard-coded. Often, what seems like a great idea – embedded "direct connect" voice integration to the WMS – is actually frozen and highly expensive to change. This leads to a "deadly embrace" where the cost to change is so great that improvements which could make the operation more efficient and competitive cannot be realistically considered.

How can voice become adaptive to the WMS? By taking

To validate the adaptability of the voice-WMS interface, enterprises need to ask to see the integration toolset, and verify how data is moved and transformed between the two systems.

Beyond VoxConnect, Voxware has also developed WMS Adapters for certain major WMS packages. They contain specific voice solutions for the target WMS, as well as pre-fabricated standard integration components. Voxware WMS Adapters differ from other "out of the

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Software Portability Cost Reduction

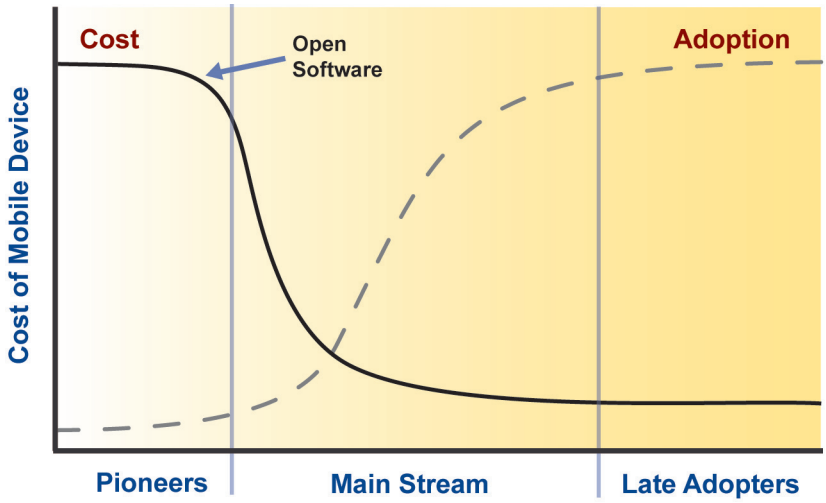


Figure 5

box" voice-WMS integration solutions because they are based on the VoxConnect EAI tool. This overcomes the problem that plagues many pre-built "direct connect" solutions, which can only be changed through a programming project.

Wearable Device Adaptability

The overwhelming majority of voice solutions are programmed to operate only on a specific wearable computer. While some may tout this fact as a benefit (saying the application can be written to take advantage of a device's unique capabilities), in reality it is a huge liability.

When the voice solution only runs on a given hardware device, customers are locked-in. They have, in effect, become "hardware hostages." When customers are locked-in, they must contend with the typical challenges that come from dealing with a sole-source vendor, such as high cost accessories like headsets.

Although the voice solution provider may support other devices, it's important to delve into the details to find out what will happen if you actually want to switch to a new device. What are the caveats and restrictions?

- Will the vendor's application run on the new device without any programming changes?
- Is the same underlying product and voice recognizer used for the new device as on the old?
- Does the vendor deliver equivalent recognition performance on both devices?
- Does the vendor require a new software license to operate the application on the new device?

When you begin to ask questions like these, you discover interesting things. You may learn that the vendor actually markets different voice products for different devices, or must use different underlying recognizers in different situations, or has a policy of charging large fees for licenses or programming work needed to switch to a new device.

A fundamental element of reducing TCO is software portability (see Figure 5). When solutions are closed, hardware is usually proprietary and costs are high. Customers need adaptive voice software that operates equally well on a range of devices – because that is the gateway to flexibility and long-term cost control.

Adaptive voice software is portable across different wearable computers, from different manufacturers, that are used for warehousing applications. "Portable" means that the same application should operate with no programming changes when moved from device A to device B.

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Voxware accomplishes this objective with Voice Portability Assurance, part of its Adaptive Voice Framework. Voice Portability Assurance is an architectural commitment to ensure that every Voxware 3 voice solution is fully portable across all wearable computers certified by Voxware – regardless of who manufactures a device or what other features beyond voice-recognition it possesses.

IT Infrastructure Adaptability

When voice solutions were being pioneered, every offering was closed and proprietary. There was only one deployment option – decentralized – and one technology stack supported by the voice vendor.

But voice solutions don't operate in a vacuum. They are an extension of key enterprise software systems that manage operations which are strategic to the company. Today's buyers want to avoid the additional cost and headaches of managing voice solutions that must be "force-fit" into their IT infrastructure.

Adaptive voice software should have a centralized management capability, and options for how the solution is administered.

IT must procure servers and license for infrastructure components like OS and DBMS software. When options are few, costs can escalate dramatically.

IT manages tasks such as configuring voice applications and deploying them to one or more warehouses. IT also must administer updates to the voice solution in a controlled and secure manner. Also, there is the need to manage updates to core voice software components at the device level – in this case IT needs a capability that enables such updates to be accomplished from the central data center, ideally in a way that is transparent to workers at each local DC.

There are also Operations-related tasks that need to be

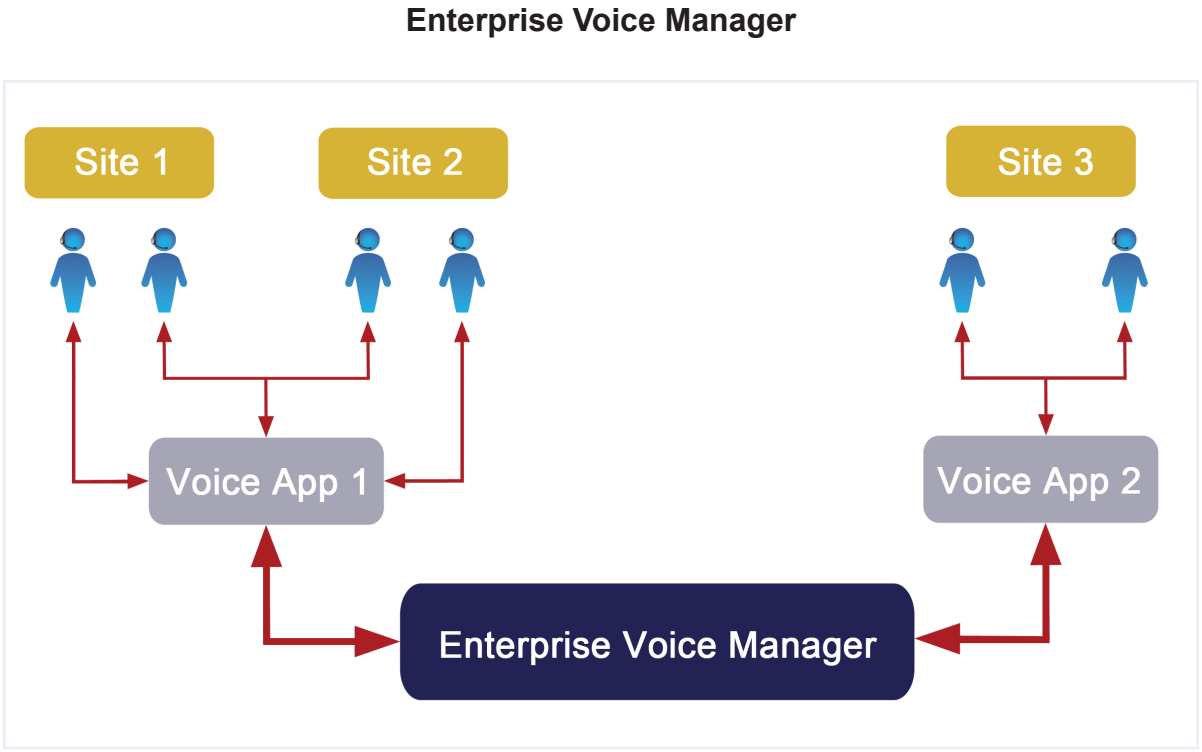


Figure 6

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centrally administered. The voice solution must provide Operations with a global view of work activity as it progresses across all of the DCs.

In Voxware's Adaptive Voice Framework, the Enterprise Voice Manager provides central command and control (see Figure 6). It ensures that the voice solution will more easily adapt to the IT and operational standards of the enterprise. Both IT and Operations need the ability to tailor a voice solution to the specific business requirements of a given site. Having central management tools that keep the various voice solutions clearly identified enables this kind of activity.

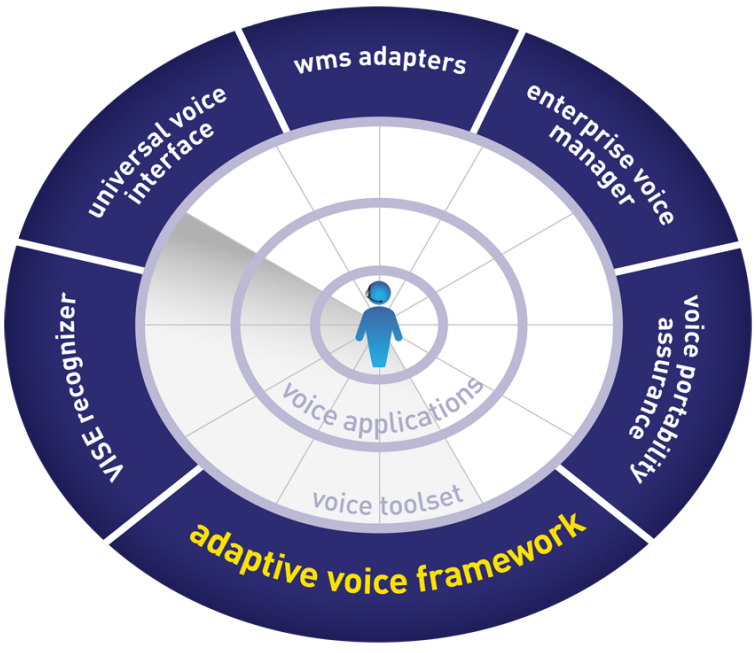
Today's buyers are looking at all elements of TCO over the life of the solution. They need enterprise-level services that mitigate the cost and complexity associated with managing proprietary, single-site point solutions.

Voxware's Adaptive Voice Framework

Although voice solutions are an extension of the strategic WMS or ERP system, they quickly become mission-critical applications because they are used by many workers and optimize the highest-cost areas of warehouse operation.

In the past, companies implemented custom-programmed point solutions with proprietary architectures because no other solutions were available. But after delivering immediate benefits, these solutions often inhibited the organization's ability to respond to change, because they were not designed to accommodate the need for adaptability across all of the five dimensions outlined above.

Today, adaptive voice software has become the new requirement for enterprises who want the immediate benefits of voice without sacrificing long term flexibility or control. Voxware's software product, Voxware 3, delivers this important requirement through its Adaptive Voice Framework.



voxware 3

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