SENSIBLE DoD ASSET MANAGEMENT AND TRACKING:

The Business Case for Thermal Label Printing for IUID Marking

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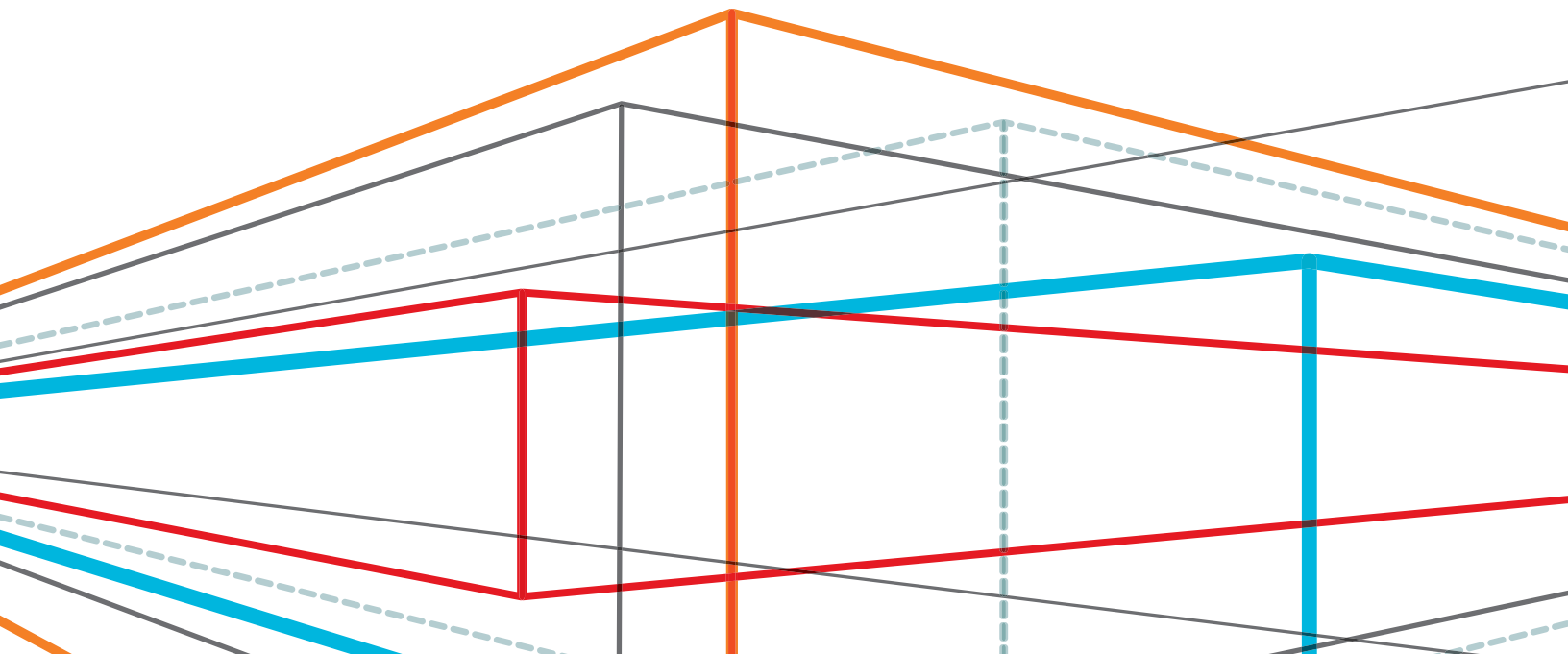
EXECUTIVE SUMMARY

Since January 1, 2004, Department of Defense (DoD) policy has required that all newly requisitioned government furnished property (GFP) be marked with a serialized unique identification number (UID). All tangible items that are considered personal property owned by the DoD are encompassed by this requirement and must be marked with an item unique identification number (IUID). The DoD's 60,000-plus suppliers are expected to mark their products going forward and some are already doing so. This ambitious item marking policy is essential to the broader DoD goal of being able to achieve visibility of all GFP, as well as huge numbers of legacy assets, in a comprehensive UID Registry.

The rationale for this massive effort is, quite simply, efficiency. Being able to quickly and accurately track DoD assets worldwide obviously has the potential to deliver tremendous savings in terms of time, cost, manpower, and avoidance of confusion in the difficult worldwide mission of getting the right assets to where they are needed, when they are needed. If UID policy works as anticipated, warfighters will benefit from better logistics and DoD program managers will see significant gains in efficiency and visibility across the board.

Yet, adoption of UID lags on both the government and commercial sides. The DoD has many competing priorities for attention and funding within limited budgets. Its global missions are intense and large volumes of assets of all types are urgently required in widely dispersed locations. With any delay, troops can suffer. DoD suppliers are also under competing pressure to speed operations and control costs to win and keep their government business.

UID compliance today must be factored into the enterprise considerations of both DoD program managers and supplier companies. Often compliance is seen by both groups as just another "pain point," an obstacle and an added draw on time and finances. This view can be a serious mistake—and the misconception can become the real obstacle. While any new level of compliance requirements certainly adds new considerations for suppliers and end-users alike, the comprehensive adoption of UID technology can actually create many business process benefits for both the DoD and its suppliers. This paper seeks to explain how.

UNDERSTANDING THE BUSINESS SITUATION

UID is an important mandate for the DoD. Since 1990, the Government Accountability Office (GAO) has identified DoD supply chain management as on the list of "high-risk areas needing urgent attention." Government program managers and contractors alike selling into the DoD should expect the push for UID to continue and expand. As a key component of the military's broader Wide Area Work Flow (WAWF) system, the UID mandate is essential to achieving the visibility of all assets required for continuous reporting and for meeting GAO requirements for cost accountability and containment. According to the Office of the Secretary of Defense, 90 percent of new acquisition contracts contained IUID requirement as of July 2009.

The visibility provided by UID enables the electronic capture of information about every component of even the most complex military systems throughout their entire life cycle, whether in deployment, transport, storage, or repair. The intelligent data made available to asset managers in this way can support all aspects of property use and maintenance, making knowledge-enabled logistics and reporting a reality.

However, a GAO report of January 2009 noted that the DoD is still falling short of fully embracing UID by effectively implementing relevant logistics processes Department-wide. Despite implementation of IUID technologies at several locations, GAO found that because collection of data on implementation costs and performance-based outcome measures was not

being accomplished, accurate ROI could not be established. Nevertheless, in July 2009, the Office of the Secretary of Defense published a Strategic Perspective on IUID, which validated the value proposition of IUID and pressed for stronger implementation efforts. The rationale cited significant efficiency and effectiveness improvements beyond previous and existing data capture and tracking mechanisms, including improvements in both accuracy and speed, reduced personnel requirements, and lower costs.

With all these tangible business advantages, why does IUID adoption remain a slow and painful process? It is, in part, because the implementation standards can appear complex and intimidating, with obligations to mark, track, and report on government deliverables frequently and in highly specified ways. This makes it appear to many DoD contractors and suppliers that UID technology itself must be complex and a hindrance to business. In fact, the opposite is true. While complex and expensive marking technologies do exist, others that are almost as simple as ordinary office copying and label making will suffice for more than three-quarters of all IUID requirements, according to the DoD. Furthermore, UID integration can make internal business processes much easier, not more difficult. Much of the resistance to UID mandates has been founded on myths.

DISPELLING SIX UID BUSINESS MYTHS

Myth #1: IUID marking is complex and expensive.

This is only true if complex and expensive processes, such as direct part marking (DPM) with lasers, are selected. In most cases that is unnecessary. In fact, DoD has estimated that simple and inexpensive thermal transfer barcoded labels are sufficient for about 80 percent of all assets requiring an IUID mark. This is especially important for small businesses and small, disadvantaged government contractors to understand. UID "overkill" using expensive techniques is an easily avoidable mistake that can be costly, time-consuming, and totally unnecessary.

Myth #2: IUID marks have to last forever!

Not true. They are not designed for future archaeologists. DoD only requires that most IUID markings last for the useful life of the asset—from a few years to a few decades, not for eternity. Simple thermal printer labels on durable materials have a useful lifespan more than satisfactory to match most government asset categories.

Myth #3: IUID marking is just one more nuisance and expense of doing business with the government.

While it's true that DoD is smart to be out in the forefront of this new business process, the UID trend is rapidly spreading throughout the commercial world as well. From airlines to car manufacturers to medical device and computer makers, leading private sector enterprises around the world are eagerly adopting asset tracking technologies—not because they are required to, but because UID makes good business sense.

Myth #4: Only large contractors can afford UID and meet all the requirements.

Not true according to The Office of the Under Secretary of Defense for Acquisition Technology and Logistics, which states: "The UID Program Office is unaware of any small business that cannot afford to comply with the UID policy…We anticipate that most small vendors will be able to comply using labels and data plates readily and inexpensively available in the commercial market."

Myth #5: Contractors selling to the DoD will have to take on all the expense, manpower, equipment, and expertise in-house in order to comply with UID.

Proven packaged solutions exist and can be affordably obtained and brought into play quickly. Larger manufacturers will usually benefit from purchasing their own thermal barcode label printers or other equipment along with appropriate training; large-volume use or continuing government contracts will ensure a secure ROI. However, the cost-effective solution for some smaller or less-frequent DoD suppliers may be a packaged solution. Keep reading for some guidelines on "What to Look For" when evaluating solution providers.

Myth #6: IUID requirements are an obstacle to doing business with the government and have little use beyond meeting DoD requirements.

This is the biggest myth of all, and dispelling it is the subject of most of the paper that follows. In fact, once UID equipment and processes have been put in place, a host of business benefits can be harvested by manufacturers and suppliers who learn how to apply the power of asset management internally, as well as externally for their government customer.

UID MARKING MAKES BUSINESS SENSE

Put aside for a moment that IUID marking is a mandated requirement. Above and beyond the mandate there is a wealth of benefits that can flow from barcode-based asset management and tracking. Without any mandate, private sector companies are voluntarily moving into the UID universe in industries ranging from retail merchandising and medical equipment to auto and aircraft manufacturing. Far-sighted CEOs, CFOs, and CIOs recognize the potential for significant gains in operational efficiencies and cost savings. Those same gains are available to DoD program managers and to their suppliers alike when UID is accepted as an opportunity rather than an obstacle.

The DoD's complex global mission requires a higher degree of true enterprise visibility than almost any other organization in the public or private sector. The successful adoption of UID marking and all its related tracking and reporting capabilities offers the possibility of creating a truly holistic enterprise. It's the opportunity to overcome fragmentation of asset visibility and to unify asset awareness worldwide, and it can significantly increase mission effectiveness from the war front to the home front.

Contractors and suppliers who actively become a part of the UID transformation of asset management stand to benefit in many ways. Beyond simply "complying," they can become partners with DoD planners and managers to bring the entire DoD logistics system into the new century, while streamlining their own core business processes at the same time. Here are a few of the possible business benefits:

- **Operational Benefits—**While barcoded labels are most often applied on the shipping docks, there are substantial benefits to be gained by integrating UID procedures into the early and mid-production processes. Thermal printed labels, for example, can track procedures end-to-end across many operations. They can be adapted to construct audit trails automatically while products are in production, with all the quality assurance (QA) and International Organization for Standardization (ISO) advantages that entails. Among many other operational benefits, individual lots can be independently tracked for custom manufacturing and/or delivery.

- **Manufacturing Benefits—**Many new flexible manufacturing practices have special production and tracking requirements, which can be met by IUID barcoding. By encoding required information and production details directly onto the manufactured product as an integral component, important documentation travels with the item and adds value to what the customer receives. IUID tracking also supports just-in-time delivery and other asset and inventory management trends that are creating competitive advantages for manufacturers in many industries.

- **Production Benefits—**There is simply no comparison between barcode scanning, which ensures nearly 100 percent data accuracy, and all manual methods of data entry and item checking. When critical production data is scanned into the enterprise system, production managers can be confident that what they are working with is accurate and reliable for use in all applications and schedules. Costly production planning systems are only as good as the data being entered, and the limited additional investment in an IUID label system can ensure confidence in data quality.

- **Supply Chain Benefits**—Barcoding is the most widely accepted tool for getting reliably accurate data into enterprise applications across many industries. Enterprises that lack this level of accurate information cannot maintain precise, cost-effective inventories. They must incur the expense of carrying excess inventory to avoid shortfall risks. By making inventory replacement a logical supply chain procedure, IUID marking enables gains in warehouse utilization and may even improve cash flow through faster billing. It is a superior solution to expensive enterprise resource planning (ERP) software, which fails to deliver useful visibility when data is outdated, inaccurate, or unavailable.

- **Workforce Benefits**—When a process is not only faster but also more accurate, it is a winner. UID code scanning is many times faster than manual inspection processes, and it is better that 99.9 percent accurate. Personnel gains accrue at both ends of the production tracking process through faster data entry and more rapid data collection and checking—a world away from the pitfalls and potential mistakes in the workplace environment of pens, pencils, and paper forms.

- **Wide Area Workflow (WAWF) Benefits**—WAWF is an electronic, paperless contracting application that eliminates labor-intensive, paper-based tasks from the contracting process. DoD policy strongly supports the expansion of WAWF. IUID markings enable WAWP programs by providing the easy-to-scan foundation for item visibility, improved life cycle item management and accountability, and the clean financial audits that can help speed government contract payments.

- **Workflow Collaboration Benefits**—True collaboration across a single integrated enterprise is only possible if every authorized person in the operation has easy access to items in the production or supply workflow. Reliable, common product and asset marking that can be easily scanned and tracked has a positive unifying effect. Productivity goes up, mistakes go down, and the bottom line benefits from productive collaboration.

- **Quality Control & Quality Assurance Benefits**—Quality failures are much less likely because of the clear advantages barcode scanning has over traditional manual and visual inspection of items. Whether in the supplier's production flow, on the shipping/receiving docks, in inventory, or after delivery to DoD, during military deployment or repair facilities, clear UID markings make QA faster and easier to accomplish and help support the highest ISO standards.

CHOOSING A UID SOLUTION: WHAT TO LOOK FOR

All contractors that manufacture or supply GFP to DoD programs should carefully consider the specifications and capabilities of the wide variety of UID solutions available. The same considerations apply to any DoD program manager responsible for marking legacy items in use or in inventory. It makes good business sense for any organization with large or ongoing needs to develop in-house compliance capabilities and acquire their own UID marking equipment. Outsourcing is a sensible option for suppliers with limited DoD business or short-term contracts, or while in-house solutions are being developed.

Whether considering the direct purchase of printing and marking equipment to be used in-house or exploring packaged outsourcing solutions that use such equipment, there are certain questions that should be asked before a decision is made. The following suggestions are offered to guide discussions with UID solution vendors:

- Your solution must be matched to your requirement. Don't purchase a more expensive or more complex IUID marking technology than you need. Manufacturers and suppliers often waste money buying costly DPM solutions like laser etching and dot peening without being aware that eight out of 10 items bought by the DoD can be adequately marked with much less expensive thermal label printers.

- Ensure that the marking solution you choose produces a label or mark that meets all required military standard formatting specifics (currently MIL STD 130). These standards will include such criteria as barcode density and the minimum content the label can contain.

- Be certain that the marks or labels generated contain IUID data elements that are unambiguous so that they can be seamlessly fed into the DoD Registry by asset management information systems. Several forms of expression are acceptable, singly or in combination, including linear barcode, 2-D barcode, and human-readable text. However, information for each item must arrive at the Registry in a rigid format of up to 72 characters per UID.

- In addition to military standards conformance, also be sure that the barcode label or mark will meet ISO standards for formatting, verification, and syntax (currently ISO/IEC 15434).

- Barcodes must be produced within very tight tolerances, with the width of bars and spaces measured in thousandths of an inch. Slight inconsistencies in bar width, or insufficient contrast, can make the symbol unreadable and the data inaccessible. Question the vendor about tolerances.

- Reliability and accuracy of data is all-important. If a IUID mark contains incorrect data, or if it does not meet DoD verification and validation standards, submission to the Registry will not be possible. There will be confusion, time lost, disconnects in parent/child relationships, and possibly problems with contract payments. Talk to the vendor about how its solution ensures accuracy.

- If the item being manufactured or supplied is to be embedded as part of a larger system, talk to your UID solution vendor about parent/child linkages for reporting to the Registry. It is important that the label or marking solution you choose can handle these crucial linked data relationships.

- Software is an essential component of any UID solution. Ensure that the software included is capable of generating properly formatted IUID data for reporting. It should also enable prompts and other safeguards—such as an intelligent decoding system—that will help prevent mistakes by untrained or partially trained barcode scanning personnel. The solution vendor should also commit to making available timely software updates that track changing DoD requirements.

- Be certain that any solution you choose supports the full cycle of compliance requirements, from suitable marking to getting the data uploaded correctly via the DoD portal to the mother UID Registry.

- Ask particularly about support for label scanning, electronic readers and verifiers, automatic prompts for actions, and data interpretation to prepare for reporting to the government's Wide Area Work Flow database and UID Registry.

- If an item is required to withstand battlefield conditions, extreme environments and weather conditions, or proximity to caustic materials, be sure your solution is up to the task. Thermal transfer printing, for example, can be performed on highly durable stocks capable of standing up to high temperatures, dust and sand, corrosive materials, and hard battlefield wear. To ensure optimum performance, purchasers should look for extremely durable label synthetic materials designed to provide item-lifetime identification even for items exposed to challenging, hazardous environments.

- Thermal transfer printers and supplies are not fully interchangeable. When evaluating printers, it is important to determine if they can accommodate all the media sizes required for labels. It is also imperative to make sure the printer vendor can supply label stock with the required heat, chemical, and abrasion resistance in all the correct sizes.

- Insist on top-quality media, because the problems that result from using non-optimized media are not always immediately apparent. The greatest danger is that the Data Matrix symbol will fade over time and become unreadable. Label adhesives and protective coatings may also fail. Incompatible media can also cause the thermal printhead to work harder and lead to premature failure. These problems more than offset any money that might be saved by trying to use incompatible or bargain media for IUID printing.

- All UID marking equipment and supplies should have been independently tested and certified to meet the DoD's requirements for UID labeling under MIL-STD-130, MIL-STD-129, and MIL-PRF-61002A.

- As with any business or manufacturing system, long-term maintenance costs are an important consideration. Ask the vendor to compare maintenance and supply costs for various available UID marking solutions, such as DPM, ink jet, laser, and thermal transfer printing.

THERMAL TRANSFER PRINTING IS THE SENSIBLE UID MARKING CHOICE

For most DoD IUID marking requirements (DoD estimates 80 percent), thermal transfer label printing is sufficient. It is readily available, easy to learn and use, and inexpensive compared to every other IUID marking option. Simple on-demand barcode label printers are all most DoD suppliers and agencies will need to satisfy their marking requirements. Their output is suitable for items where a permanent adhesive label can be affixed to the item. Direct thermal and thermal transfer on-demand printers are the technology of choice for mission-critical barcode labeling applications in manufacturing, logistics, aerospace, and most other industries.

The more common direct thermal printers use no ribbon and apply heat directly to chemically treated media. Thermal transfer printers work by using a printhead to apply heat to a ribbon, which melts the image onto the label material. This creates an even longer-lasting image than direct thermal printing. Thermal transfer printers provide outstanding print quality for Data Matrix symbols, especially for small items.

Thermal transfer printers are designed specifically to create long-lasting barcode labels. They are ideally suited to meet the DoD's IUID requirements because they work with a wide range of highly durable media that can withstand extreme temperatures, harsh environments, and the sand and grit of battlefield conditions.

Despite all their advantages, thermal transfer printers cost the least to purchase and offer the lowest cost to operate of any in-house marking option. There are many styles, ranging from compact desktop units to high-speed industrial models that can be used on packaging lines to automatically apply labels in high-volume environments. Small, wireless, mobile models are also available and are ideal for fast-moving warehouse use or in the field.

Receiving print commands with part numbers and other variable data for encoding should not slow down label printing or otherwise reduce printer efficiency. Many models have native support for Data Matrix, so no upgrades or additional software are required. Thermal transfer printers are compatible with a wide range of synthetic media suitable for lifetime identification, including labels that can withstand temperatures up to 600° F. Because thermal transfer printers are purpose-built for labeling, there is virtually no media waste and it is easy for operators to load media themselves, with minimal downtime.

BE GUIDED BY THE EXPERTS

Zebra Technologies is the subject matter expert on DoD's UID requirements, and the leading expert on IUID marking via thermal transfer printing. Zebra offers a range of solutions designed to meet the DoD's UID marking mandate at affordable cost points. In fact, Zebra thermal transfer label printers are the lowest-cost and easiest-to-use option available for UID labeling. This affordable solution is suitable for marking all but about a specialized 20 percent of items sold to the DoD, by its own estimate. Specifically, Zebra thermal transfer label printers, label design software, and genuine Zebra™ supplies produce Data Matrix 2-D barcodes that last for the useful life of the item, as required by DoD's UID policy.

Zebra printers give DoD suppliers the flexibility to create integrated systems to meet not only UID, but also Wide Area Workflow reporting, and barcode and passive radio frequency identification (RFID) shipment labeling requirements. The DoD successfully pioneered pallet tracking with RFID, and Zebra was the first manufacturer to introduce a commercially available RFID smart label printer/encoder.

Zebra's durable and reliable Xi™ series thermal transfer printers are designed for the DoD's mission-critical environments. The Xi series offers a range of print widths, speeds, and print resolutions for printing serially managed parts, engine components, even extremely small electronic component labels. The 600-dpi print resolution option can achieve "A" ratings on very small Data Matrix 2-D marks.

Genuine Zebra supplies offer specialty coatings for prolonged UV exposure, specialty adhesives for extreme cold or hot temperatures, and materials with abrasion-resistance in sandstorms. Plus, many Zebra label/ribbon combinations have been independently tested to meet compliance with the DoD's requirements for UID labeling under MIL-STD-130 and MIL-PRF-61002A.

ZebraDesigner™ Pro v2, Zebra's easy-to-use label design software, enables users to create and print UID labels for accurate, detailed, real-time data reporting, with easy integration into current operations and business systems. Zebra's UID solutions are also forward thinking into other areas of compliance. An RFID Ready Xi printer enables a rapid upgrade to RFID if and when that capability is required.

SUMMARY AND CONCLUSION

The wealth of tangible business advantages that result from the adoption of UID item labeling makes it clear that it would be a mistake to consider this DoD mandate an obstacle or hindrance to business. Contractors and suppliers can easily develop this new capability, which will not only streamline their business with the government, but also provide a host of improvements to their own workflow, productivity, and competitive edge. In most cases, thermal barcode printing is the simple answer to this business need, and the sooner it is fully adopted and integrated into the business/government supply chain the sooner both contractors and defense contracting agencies will begin to harvest the benefits of this sensible investment.

Thermal barcode label printers are built to satisfy business concerns about printer and operator productivity, print quality, efficiency, cost of supplies, size and type requirements, and total cost of ownership. From their initial setup, to daily use and long-term maintenance, dedicated thermal printers are the most cost-effective and convenient option for barcode labeling. Users will enjoy operating cost, ease-of-use and reliability benefits whether they print a few labels a week or hundreds of labels a day.

Barcoding is a sophisticated print operation that requires a specialty printer. Dozens of printer models are available to precisely satisfy different user requirements for print volume, speed, symbologies, label materials, interfaces, and other features.

A global leader respected for innovation and reliability, Zebra offers technologies that illuminate organizations' operational events involving their assets, people and transactions, allowing them to see opportunities to create new value. We call it the Visible Value Chain.

Zebra's extensive portfolio of marking and printing technologies, including barcode, RFID, GPS and sensoring, turns the physical into the digital to give operational events a virtual voice. This enables organizations to know in real-time the location, condition, timing and accuracy of the events occurring throughout their value chain. Once the events are seen, organizations can create new value from what is already there.

For more information about Zebra's solutions, visit www.zebra.com.
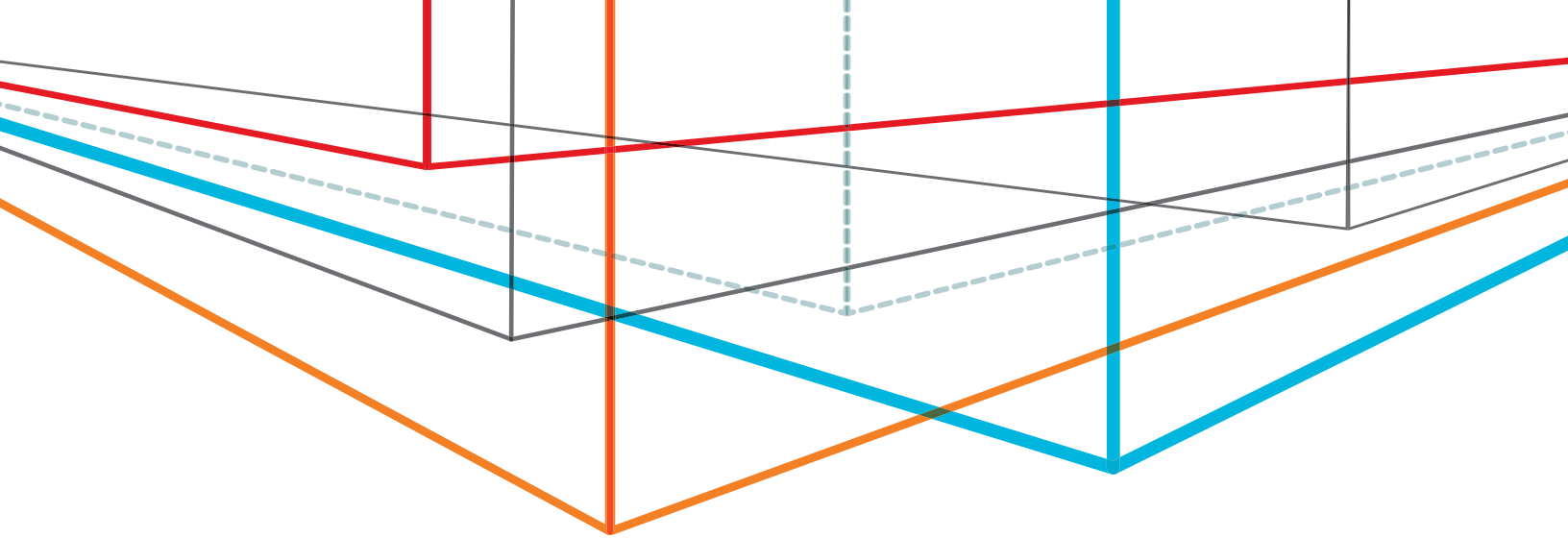
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