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## Partners begin effort to envision future supply chain systems

*by Brent Burkholder, CDC, and Ibrahim El-Ziq, UNICEF Supply Division*

In November 2009 at the [GAVI Alliance Partners Forum](#) in Hanoi, a group of 43 participants sat down to discuss their vision for future supply chain systems for health. The 2025 Vision is the common platform behind which all key partners at the country, regional, and global levels can unite aligning short-term actions to achieve long-term priorities and directions.

The visioning process began as a series of brainstorming discussions amongst several stakeholders with the aim of developing a vision as a working hypothesis designed to stimulate discussion and thinking. Key to its success and refinement will be the involvement, input, and guidance from all those with a vested interest in future supply chain systems.

As the vision evolves, it will help define how supply chains of the future should be designed and what they need to be able to do. For example, the vision describes future supply chains as enablers of health systems rather than merely responsive to health system needs. For the supply system to be an active enabler, the system must have the ability to predict and propose changes before health needs change and have the ability to scan the technology horizon so that new innovations can be evaluated and adopted in a reasonable time frame.

**2025 Vision: a working hypothesis**

Vision: By 2025, state-of-the-art supply systems meet the changing needs of a changing world.

Objective: To enable the right vaccines to be in the right place, at the right time, in the right quantities, in the right condition, at the right cost. Specific steps to achieve this objective are listed below:

- Vaccine products and their packaging are designed with characteristics that best suit the operational needs of countries while ensuring that the highest standards of safety are maintained.
- Vaccine distribution systems are streamlined for maximum efficiency and are built around mechanisms that support continuous learning to improve system performance.
- Vaccine supply systems are integrated with the supply systems of other health programs to maximize synergies and make the best strategic links with the private sector.
- The environmental impact of energy, materials, and processes used in vaccine distribution systems at the national and international levels is monitored and minimized.

Partners are already starting to use the vision to orient their work. [Project Optimize](#), one of the groups involved in developing the working hypothesis for the 2025 vision, is using the 2025 vision to determine research questions in its demonstration projects, to steer the development of new systems that encourage innovation, and to support policy changes that enable the right products and systems to be adopted and scaled up.

The [United Nations Children's Fund \(UNICEF\) Supply Division](#) is another partner whose work is in line with the 2025 vision. For example, in order to streamline vaccine distribution systems to maximize efficiency, UNICEF Supply Division has developed a [vaccine weight-and-volume calculator](#). This useful tool will be available to other partners and integrated in the UNICEF country provisional plans so countries can monitor cold storage capacity at the central level throughout the year, taking into account planned vaccine deliveries, type of vaccines, as well as buffer stocks.

In December 2009, UNICEF also issued a Cold Chain Support Package, available on the UNICEF intranet. The support package is a technical and commercial guideline for countries planning to increase their cold store capacity at the central level and has the relevant links to existing World Health Organization guidelines. It covers cold rooms and freezer rooms and will soon be covering solar-powered refrigeration systems. UNICEF is further involved in "greening" the cold chain through the [SolarChill](#) refrigerator partnership and plays a roll in moving the technology forward to countries.

Another collaborator, the [Social, Environmental, and Economic Design and Research \(SEEDR\) group](#), in a [Bill & Melinda Gates Foundation](#)-funded collaboration with the Global Immunization Division at the [US Centers for Disease Control and Prevention](#), is prototyping passive cold chain equipment with next-generation manufacturing and materials technologies. SEEDR is reengineering a vaccine carrier, long-range cold box, and specimen transport container using recycled materials to increase cold life, decrease container weight, and improve affordability.

As evidence and findings from partners' work is gathered, the vision statement will be revised based on what has been learned, resulting in a stronger, more informed vision for the future. We encourage all subscribers to share the vision with colleagues and contribute to the evidence base that validates or contradicts the latest thinking. For now subscribers are welcome to discuss and debate the vision here on the TechNet forum. [Optimize](#) will alert subscribers to other venues for discussion as they arise.

## Tunisia to demonstrate innovative supply chain solutions for the future

by Patrick Lydon and Ibrahim Abdel Rahim, WHO

A new era of immunization supply systems officially got under way on Friday, January 22, 2010, in Tunis, when the Ministry of Public Health, the [World Health Organization \(WHO\)](#), and [Project Optimize](#) formally signed a cooperative agreement. The three-year project, with a budget of US\$1.75 million, will focus on five key intervention areas:

1. Demonstrate the benefits of streamlining and integrating the supply chains for vaccines, drugs, and other temperature-sensitive products between national and regional levels.
2. Demonstrate the benefits of a “Zero Energy Cost Supply Chain” below the regional level by using solar energy to generate and feed into the grid the equivalent amount of the energy required for warehousing and transportation (using electric vehicles).
3. Modernize and improve the information systems that accompany the streamlining and integration solutions listed above.
4. Develop case studies on private-sector supply chains for vaccines and understand the role the private sector might play in the future.
5. Establish policies that promote adoption and scale-up of successful Optimize interventions in Tunisia (and, where applicable, in the Eastern Mediterranean Region) and develop a national long-term vision describing how vaccine supply systems will evolve to overcome future challenges.

Ultimately, Tunisia envisions a vaccine supply chain that:

- Is part of a single, streamlined, and integrated health supply chain supported by a rationalized and modernized health information system. In this vision, the central medical store will be responsible for the procurement, storage, and distribution of all health commodities (vaccines and temperature-sensitive products and drugs) from the national level down to regional stores via



The Minister of Health of Tunisia expresses his support for the collaboration and stresses the importance of integrating supply chains and renewable energy.

Photo credit: Patrick Lydon/WHO



The Minister of Health of Tunisia, Mr. Mondher Zenaïdi, and the WHO representative, Dr. Ibrahim Abdel Rahim, exchange signed copies of the agreement.

Photo credit: Patrick Lydon/WHO

decentralized inter-regional stores. The vision is that such a supply chain system will bring efficiencies in procurement, supply, storage, distribution, stock management, and quality of services at a lower overall cost to the system. It will also increase the responsiveness of the health supply chain to routine and emergency requests (e.g., H1N1) and prepare the system for the introduction of new larger-volume higher-cost vaccines and pharmaceuticals.

- Uses renewable energy sources in subnational segments of the supply chain for health products that require the cold chain. In other words, all the energy requirements for regional and district stores and for the transportation of health products down to health centers would be supplied by the sun.
- Increases and regulates the role of the private sector in future health commodity supply to ensure that the “six rights” are respected: right products, right quantities, right places, right times, right conditions, and at the right costs.

WHO and PATH are very pleased to be collaborating with the Government of Tunisia on the Optimize project and look forward to working with the motivated, visionary, and creative Tunisian team.

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## Cold chain and logistics taskforce focuses on interagency cooperation

*by Osman David Mansoor, UNICEF Programme Division, and Ibrahim El-Ziq, UNICEF Supply Division*

In November 2009, the United Nations Children’s Fund (UNICEF) hosted a workshop of the [Cold Chain and Logistics \(CCL\) Taskforce](#). The purpose of the workshop was to reach consensus on the approach and key actions needed to support the strengthening and expansion of CCL systems needed for new vaccine introduction. However, the work is needed not just for new vaccine introduction, but to support the routine needs of every national immunization program.

Workshop participants worked in small groups to identify the main challenges for CCL systems and propose short-term actions to address them. The challenges included the need to assess a country’s readiness for new vaccines, to share monitoring data across agencies for a more comprehensive picture of supply chain strengths and needs, to integrate vaccine and other health-related supply chain systems, and to advocate for resources toward solving CCL problems.

The CCL Taskforce created four interagency subgroups to address these challenges directly: (1) guidance, (2) monitoring, (3) advocacy, and (4) integration. With participation from the agencies and organizations working in vaccine supply chain and logistics, such as the [World Health Organization](#) and [PATH](#) (including [Optimize](#)); the [GAVI Alliance](#); [UNICEF Supply Division](#); and [John Snow, Inc.](#), the taskforce hopes to overcome challenges and achieve synergies that have not existed before.

The taskforce listed specific outcomes it expects to achieve through its coordinating efforts:

- Adequate number of vaccines are available for every immunization session.
- Vaccine wastage is minimized without affecting coverage.
- Vaccines are stored and transported without temperature damage.

- New vaccine introduction is not constrained by lack of storage/transport capacity.
- Coordination is greatly increased with a commitment towards effective integration with procurement and management of other priority health commodities.

The taskforce also mapped out activities for each subgroup. For example, in order to have an overview of the environment, the guidance subgroup will map out all existing cold chain logistics and vaccine management guidelines and tools, all partners and their roles, and potential bottlenecks along the supply chain not limited to cold chain and logistics.

The advocacy group will use existing vaccine and the Expanded Programme on Immunization network and communication channels to ensure that cold chain and logistics are incorporated in each element of immunization planning and execution. Countries, donors, and other stakeholders will thus gain a wider understanding of the importance and need to ensure an efficient cold chain and logistic system.

Progress toward these and other objectives will be posted on the [CCL website](#) where readers can also obtain the full workshop report. Subscribers who wish to join a subgroup or provide input should contact Kate Bai [kbai@unicef.org](mailto:kbai@unicef.org).

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## Japan's support for strengthening cold chain and logistics systems: lessons learned with a focus on Fridge-tags® and SolarChill

*by Terry Hart and Julian Bilous, consultants, and Osman David Mansoor, UNICEF*

In 2006, the Government of Japan offered funding to the [United Nations Children's Fund \(UNICEF\)](#) to help countries prevent and prepare for future influenza pandemics. Recognizing that support from cold chain and logistics (CCL) systems would be vital for any vaccine response, US\$8 million of this grant was used by the World Health Organization (WHO) and UNICEF in 2007 and 2008 to strengthen CCL systems in 17 countries, based on their assessments of priority needs.

UNICEF selected two consultants to review the impact of the grant in 6 of the 17 countries, with a specific focus on two pieces of new technology that can help CCL system performance: the [Fridge-tag](#) and the [SolarChill](#) refrigerator. The Fridge-tag provides a continuous record of temperatures for 30 days as well as vaccine-relevant alarms for heating and freezing. The SolarChill refrigerator is a solar-powered refrigerator with no external battery (though it currently uses a small internal replaceable battery to operate a fan); the solar panels are connected directly to the refrigerator compressor.

A key finding from the assessment was that many countries lack the human and financial resources to effectively implement and use funding for CCL support. These countries depend on external support to distribute and set up new equipment, train staff on its proper use, and monitor use. For example, in three countries only 20% of the Fridge-tags were being used in refrigerators. The lack of trained CCL system personnel, adequate supervision, and funding are major barriers to improving CCL systems.

The Fridge-tag assessment confirmed the many benefits of the device, including its value as a temperature monitoring supervisory tool, a reliable indicator of vaccine storage quality, and an indicator of when refrigerator equipment should be repaired or changed. These attributes move the decision process for cold chain equipment replacement away from "age" to "condition," offering potential savings in replacement of cold chain equipment. The device also provides a rapid and reliable indication of the

adequacy of a refrigerator's performance over the past 30 days, in contrast to the current system of twice-daily temperature recording.

The assessment identified three issues: (1) training for users to get all the benefits of the [Fridge-tag](#); (2) the two-year life and need for ongoing replacement; and (3) device failures. The first two reflect the nature of the device, and WHO is currently preparing new training materials. A device that has a replaceable battery is technologically feasible but creates other challenges. The nature of this complex device does mean that there will be occasional failures, but these are expected to be less than 1 failure per 1000 units. Further analysis of the reasons for failure is ongoing. Any defective units need to be returned to the manufacturer for analysis as well as for obtaining a replacement.

The three countries that introduced the SolarChill refrigerator found it easy to use and liked the fact that it consumes no fuel and eliminates the burdens of fuel costs and transportation of fuel to remote locations poorly served by electricity. The SolarChill is easily installed by technicians with basic mechanical and electrical skills. Better guidance is needed for installation (including correct tilt and orientation of the solar panel, admissible cable lengths, admissible cable sizes, etc.) and maintenance (especially to prevent frost buildup). In average ambient temperatures of up to 27°C, the SolarChill refrigerators tested met all WHO performance, quality, and safety standards (PQS) except one: excursions greater than 8°C occur more than 20% of the time in a five-day period. The SolarChill would meet all of the WHO/PQS criteria for qualification if the upper bar for temperature excursions were set at 10°C rather than the current 8°C. Another limitation is the relatively small capacity of the SolarChill in the context of increasing storage requirements for new vaccines and other essential health commodities. However, even with increased requirements the SolarChill has enough storage to meet the needs of populations of about 10,000 or less.

UNICEF and the CCL Taskforce will continue to explore the best use of these and other new logistics-related technologies and welcome readers to share their own experiences with these technologies or ask questions related to their use. Please contact [omansoor@unicef.org](mailto:omansoor@unicef.org).

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## **New bivalent polio vaccine simplifies logistics in hard-to-reach areas**

*by Ian Lewis, UNICEF Supply Division*

Since 2005, the [Global Polio Eradication Initiative \(GPEI\)](#) has increasingly used monovalent oral polio vaccines (OPVs) in the fight against the two wild poliovirus strains still in circulation (wild poliovirus types 1 and 3 [WPV1 and WPV3]). These vaccines have up to three times the efficacy of the traditionally used trivalent OPV and have been a strategic tool in reducing transmission of the virus to record lows in key historic reservoirs—areas where the disease continues to exist and eradication is a challenge.

To complement the large-scale use of monovalent OPVs, a new bivalent OPV has now been developed. This new vaccine is poised to accelerate progress towards a polio-free world as it simultaneously targets both WPV1 and WPV3 in one dose, while the monovalent OPVs, although potent, can only tackle one serotype at a time. A clinical trial was conducted in 2009 in India and found that bivalent OPV was clearly superior to trivalent OPV, and almost as good as the respective monovalent OPVs. The big advantage, of course, is that bivalent OPV combines the impact of the monovalent vaccines with the logistical advantage of only having to deliver a single product to target both remaining serotypes.

On December 7, 2009, 4 million doses of the newly developed bivalent OPV arrived in Afghanistan from Belgium, making Afghanistan the first country in the world to receive and use the new vaccine. Planning by the government of Afghanistan and its partners, which included ensuring adequate storage space

and outreach capacity with the supply chain, enabled the vaccine to be widely distributed during an immunization campaign targeting some 2.8 million children under the age of five years in areas where the crippling disease remains endemic.

The distribution of bivalent OPV in Afghanistan was the culmination of an unprecedented collaboration between the United Nations Children's Fund (UNICEF), the World Health Organization (WHO), vaccine suppliers, and other development partners under the oversight of national regulatory authorities, which saw the vaccine developed and delivered in record time. As with all polio vaccines procured through UNICEF, the new bivalent OPV comes standard with a [vaccine vial monitor](#), a small sticker that changes color with cumulative exposure to heat, allowing health care workers to ensure the vaccine they are giving has not been damaged by heat exposure after its long journey from the manufacturer to the remotest of health posts.

In May 2009, UNICEF issued a tender for 745 million doses, covering anticipated demand starting in the third quarter of 2009 through 2010. This was in anticipation of a positive recommendation by the [Advisory Committee on Poliomyelitis Eradication](#)—the global technical advisory body of the GPEI—for use of the vaccine. The recommendation came in June 2009, immediately after the clinical trials were concluded.

The first vaccine (from [GlaxoSmithKline \[GSK\]](#)) was licensed in early October 2009 and subsequently prequalified by WHO within three weeks. As UNICEF already had valid offers, an award was made to GSK in mid-November 2009—three weeks after prequalification.

A second bivalent OPV product (from [Panacea](#)) was prequalified by WHO on December 10, 2009, and awarded less than two weeks after that. The first delivery of 16 million doses for immunization campaigns in India followed on January 6, 2010. It is expected that additional bivalent OPVs will be prequalified by WHO in the first quarter of 2010.

Other countries will now also benefit from the new bivalent OPV. Sixty million doses have already been delivered to Nigeria, and the new vaccine is also expected to play a major role in countries at high risk of polio importations by simultaneously protecting populations from both WPV1 and WPV3.

For further information on bivalent OPV and the GPEI, please visit: [www.polioeradication.org](http://www.polioeradication.org).

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## AVI initiative confronts supply chain shortcomings

*by Stefano Maltovi, PATH, and Souleymane Kone, WHO*

The [Accelerated Vaccine Introduction \(AVI\)](#) initiative will see the first wave of pneumococcal vaccines entering up to 15 [GAVI Alliance](#)-approved countries in 2010. Another 11 countries are expected to follow suit in the next year. While some countries already have cold chain capacity for the new vaccine, independent assessments have revealed that some countries do not yet have capacity at all levels, and their introduction schedule could be delayed until they are ready.

In an attempt to minimize any delays that would prevent children from receiving this important vaccine, the [World Health Organization \(WHO\)](#) is working closely with countries to help them address and overcome short-term cold chain capacity issues. Some creative strategies include increasing the frequency of shipments to the country so that stockpiles do not overwhelm national vaccine stores. Another strategy is to bypass certain levels in the supply chain altogether. For example, if a national store lacks physical storage capacity, then the vaccines could be shipped directly to subnational stores and be

disseminated to health centers upon arrival.

While these are stop-gap measures, WHO is also working with countries to understand future introduction plans and support supply chain capacity improvements for longer-term objectives. This work, in conjunction with the work of the [United Nations Children's Fund's Cold Chain and Logistics Taskforce](#) to more assertively test a country's readiness for new vaccines, will help AVI and the [GAVI Alliance](#) avoid delays in future rounds of new vaccine introduction. In the long run [Project Optimize](#) is also working to expand the number of proven tools and policies to make supply chain systems efficient and responsive enough to not only withstand but actually enable the introduction of new technologies in the future.

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## Optimize releases new brochure

[Download](#) the new Optimize brochure in English, French, or Spanish.

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## New project announcement

The [Africa Routine Immunization System Essential project](#) is seeking input on promising routine immunization interventions in sub-Saharan Africa. [Find out how to participate.](#)

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## Supply chain issues discussed at Global Immunization Meeting

Michel Zaffran, director of Optimize, gave a presentation on supply chain and logistics strategies at the Global Immunization Meeting in Geneva in February. [Download his slides.](#)

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## Request for proposals: TechNet website management

WHO released a request for proposals for the management and ongoing improvement of the [TechNet website](#). This RFP is now closed.

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