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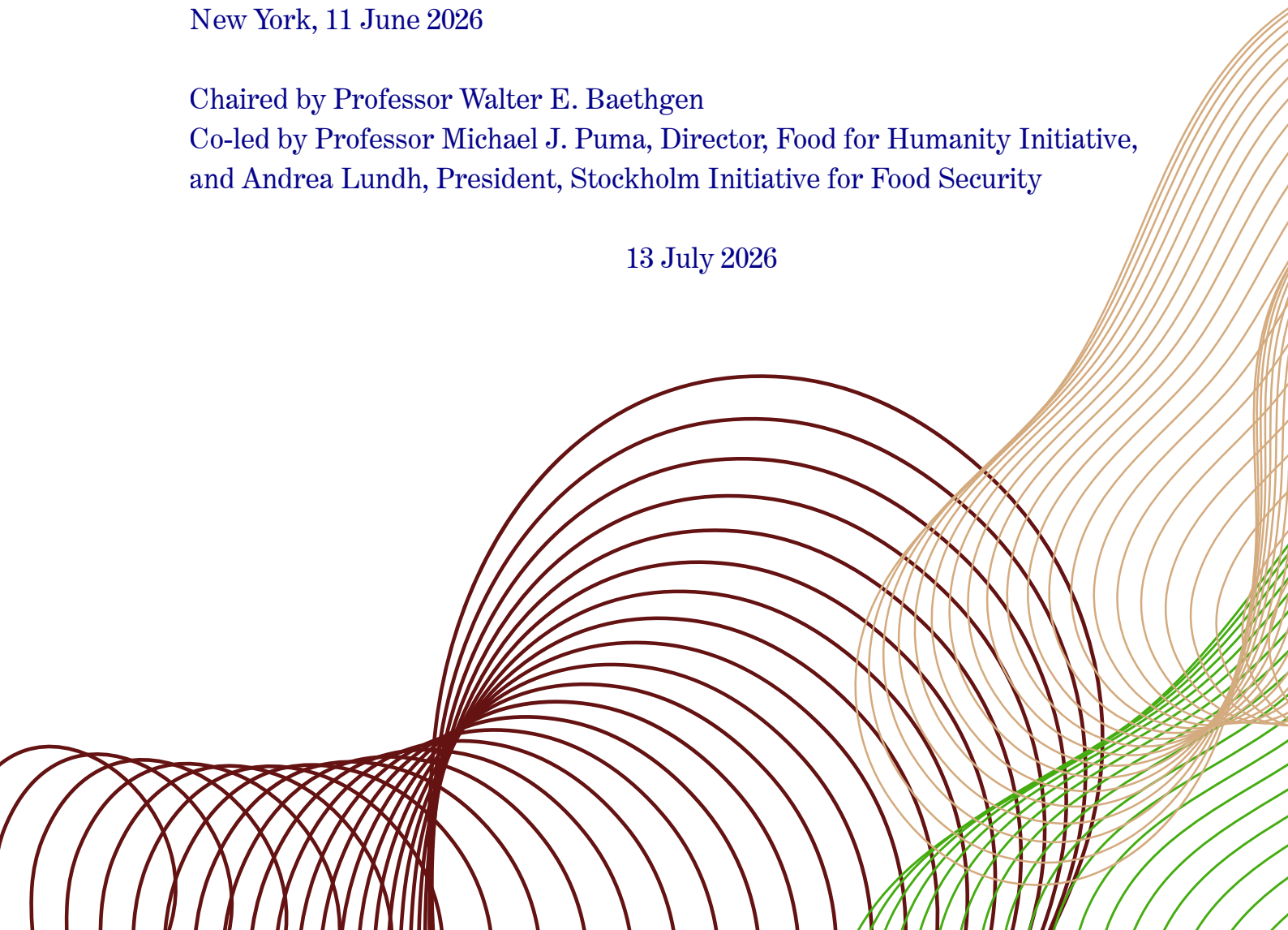
FROM KNOWLEDGE TO OPERATIONAL CAPABILITY

Food Systems Education and Field Based
Operational Platforms in the Global South
The case of Selected West African countries

Report on the Working Session held at Columbia University,
New York, 11 June 2026

Chaired by Professor Walter E. Baethgen
Co-led by Professor Michael J. Puma, Director, Food for Humanity Initiative,
and Andrea Lundh, President, Stockholm Initiative for Food Security

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From Academic Collaboration to Field-Based Operational Platforms
Food Systems Education and Research in the Global South

Chair
Professor Walter E. Baethgen

Hosted by
Professor Michael J. Puma
Andrea Lundh

Convened by
Stockholm Initiative for Food Security
Food for Humanity Initiative
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Participating Institutions

Columbia Climate School, Columbia University
Stockholm Initiative for Food Security
Food for Humanity Initiative
Columbia Center on Sustainable Investment (CCSI)
The World Bank Group
Presidential Initiatives in Agriculture and Agribusiness (PIAA), Republic of Ghana
University for Development Studies (UDS), Ghana
Swedish University of Agricultural Sciences (SLU)
Institut National de Pédologie (INP), Senegal
Institut Sénégalais de Recherches Agricoles (ISRA)
Conseil du Coton, de l'Anacarde et du Karité (CCAK), Côte d'Ivoire

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This report documents the principal discussions, conclusions and agreed directions emerging from the workshop. It is intended to support continued dialogue among participating institutions and inform the next phase of implementation under the Stockholm Initiative–Columbia University Memorandum of Understanding.

Conveners and Lead Contributors

Walter E. Baethgen, a global authority on climate risk in agriculture, water and public policy, is Senior Research Scientist (Emeritus) at the International Research Institute for Climate and Society, Columbia Climate School. An IPCC author and member of the panel awarded the 2007 Nobel Peace Prize, he has spent three decades translating climate science into decisions governments can act on.

Michael J. Puma, Professor of Climate at Columbia University's Climate School, Director of the Center for Climate Systems Research and Interim Director of the Food for Humanity Initiative. His work examines how global food systems hold or break under climate, economic and geopolitical stress, integrating food, water, trade and governance into strategies for long-term resilience.

Andrea Lundh, agronomist, food scientist and food systems practitioner, President and Co-Founder of the Stockholm Initiative for Food Security and Project Lead of Masters360. She designs institutional platforms that connect education, training, research, industry and implementation across Africa, turning knowledge and investment into stronger value chains and measurable impact.

A Note from the Chair

In this report, the reader will find a hard diagnosis. We produce wonderful knowledge that ends its life in excellent peer-reviewed journals, very far from the farmers who justified it in the first place.

Our universities reward the publication of specialized knowledge, not its translation and integration to other types of knowledge so that it helps inform decisions and policies.

The professionals who could carry science into agronomy, into training, into extension, into policy, are not trained, because our academic institutions do not provide a clear career path for them. I have repeated this for years.

Today, what is new is not the diagnosis. What is new is the response. Masters360 is one of the best architectures I have encountered that is built around the lessons we have learnt:

- Curricula must be owned by the national universities and governments that teach them, that extension is the end of every knowledge chain and the test of all of it,
- Rural realities such as the fact that pastoral systems are central and not peripheral, and
- Solutions travel best between countries of the Global South.

The convergence of the Stockholm Initiative for Food Security with Columbia's Food for Humanity Initiative, and now with the World Bank's AgriConnect, gives that architecture scientific depth on one side and scale on the other.

I have spent more than two decades at Columbia University, and the better part of a working life before and alongside it, on one question: how to connect academic knowledge with real problems. That has been the story of my years at the International Research Institute for Climate and Society, of the IPCC assessments I helped author, and of field work, on and off, from Uruguay to the Sahel.

The decision to chair this working session came from a strong conviction. For the first time in a long professional career, all the essential pieces were assembled around one table: policy, science, finance, implementation and shared commitment.

The progress of Masters360 across Senegal, Ghana and Côte d'Ivoire will continue to be followed with great interest as these pioneering initiatives move from concept to implementation. Equally important will be the opportunity to learn across countries, drawing practical lessons from each experience. The time has come to bridge the gap between the classroom and the field, and that bridge must now be crossed.

This report is therefore commended to its readers with a simple request: judge both its ideas and those behind them by what has been achieved on the ground three years from now.



Walter E. Baethgen

Emeritus Professor, Columbia University. Chair of the New York Working Session.

Foreword

The working session convened at Columbia University on 11 June 2026 is a culmination of several years of field review and research, curriculum design, faculty collaboration and high-level exchange between Stockholm, New York, Dakar, Accra, Abidjan and Marrakech. It opened a new chapter: the deployment of operational platforms on African ground.

The premise of this report is simple and demanding. Africa's food systems do not suffer from a shortage of knowledge, of capital or of political ambition. They suffer from the absence of systems that convert and then monitor these assets into capability where it matters, on farms, in value chains, in public institutions.

Building those systems is an educational task before it is a financial one. It is also, we believe, the most consequential investment available in this field today.

What follows is the record of a working session, the analysis that underpinned it, and the commitments it produced. It is addressed to those who took part, to the institutions they represent, and to the partners and funders we now invite to build with us.

May they all find here the expression of our gratitude, admiration and thanks.

We have written it to be kept, consulted and used.



Andrea Lundh

President and Co-Founder,
Stockholm Initiative for Food Security



Michael J. Puma

Professor of Climate; Director, Center for Climate Systems Research and the Food for Humanity Initiative, Columbia Climate School

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Executive Summary

The diagnosis is settled, and it is severe. In Africa, one person in five is undernourished, some 307 million people, and the number is climbing while it falls almost everywhere else [1]. At the same time, the continent is about to meet its largest-ever generation of young people with a labor market that has no room for them: 362 million will reach working age this decade, and on present trends fewer than half will find work [2].

On 11 June 2026, the Stockholm Initiative for Food Security (Stockholm Initiative) and the Columbia Climate School convened a closed working session at Columbia University in New York to close the distance between those two facts. Its aim was less to describe the problem again than to settle what the partners would build, and how to build it.

More than two decades and several hundred billion dollars have not closed that gap, which tells you the constraint is not money, and it is not knowledge. It is structural. It is the layer in between: the institutions and the people that turn research, finance and policy into capability on a farm, in a value chain, in a ministry. Build that layer and the rest of the investment begins to work; leave it empty and, in the World Bank's own words from the session "every dollar we put into infrastructure or finance will underperform" [2].

Building that layer is what this partnership is actively doing. Stockholm Initiative's Masters360 is a practice-oriented education architecture, developed with Columbia University and several African partners and now being established as platforms in three countries: In Senegal, with the National Academy of Sciences and Technology (ANSTS), the Ministry of Agriculture, Food Sovereignty and Livestock (MASAE), the Institut Sénégalais de Recherches Agricoles (ISRA) and the Institut National de Pédologie (INP). In Ghana, with the University for Development Studies (UDS) and the Presidential Initiatives in Agriculture and Agribusiness (PIAA); and in Côte d'Ivoire, with the Conseil du Coton, de l'Anacarde et du Karité (CCAK) and the Institut National Polytechnique Félix Houphouët-Boigny (INP-HB). Columbia's Food for Humanity Initiative supplies the complementary science: food-system dynamics, operational intelligence and the living lab concept, so that the two form one continuum, from knowledge to workforce to delivery.

The platforms are built on agreements already signed, and this report marks plainly what stands today and what is still to come.

This architecture defines the report's overarching structure and analytical logic. Masters360 trains the people who make a food system work across its whole length: those who research it, who carry that knowledge to the field through extension and advisory services, who run the farms and enterprises along the value chain, and who govern it. The aim that joins them is to keep more of the system's value, its work and its food in the country. For some that means raising what the land yields; for others, capturing a margin that now leaves the country; for others again, feeding people closer to where they live.

The meeting marked an uncommon convergence of the institutions needed to translate ambition into execution. Around one table sat senior leaders from the World Bank, the Office of the President of Ghana through PIAA, Senegal's research system through the Directors General of ISRA and INP, and partner universities including the Swedish University of Agricultural Sciences (SLU) and Columbia University.

The Bank presented AgriConnect, its initiative to move 300 million farmers up the value chain by 2030 and to double its agribusiness financing to 9 billion dollars a year, with knowledge partners named among its pillars [2]. Its direction and this partnership's work point the same way, and the report records that alignment.

The working session produced commitments, not conclusions: a draft New York Declaration; a sequenced action plan over 30 days, 90 days, 12 months and 36 months; a first co-taught curriculum line in climate-risk management; a standing South-South exchange across the three platforms; an operational roadmap designed from inception for bankability and replicability; and a continuing conversation with the World Bank.

This report sets out the analysis, the architecture, the proceedings and the commitments, and closes with the investment case. What is sought now is the institutional resolve and the capital to carry the intellectual foundation, the partnerships and the platforms to scale.

1. Context and Institutional Trajectory

Masters360 is a practice-oriented curriculum architecture, developed by the Stockholm Initiative with Columbia Climate School and African partners. It sets out to form not graduates who have studied agriculture but operators who can run a part of a food system and keep its value in their own country. It is meant to be owned by the national universities and institutions that teach it. The trajectory in this chapter records how it was developed; Chapter 4 sets out the operation.

New York was not a beginning. It was a step in a process built over several years through formal agreement, curriculum co-design and exchange, and one feature runs through all of it: the architecture was developed with the partner institutions rather than desk-designed centrally somewhere and introduced to them.

1.1 The hosting partners' collaboration framework

The collaboration rests on a Memorandum of Understanding between Columbia University and Stockholm Initiative, signed at Columbia in 2024. On the Columbia side, it is carried by the Climate School and more recently led by Professor Michael J. Puma through the Food for Humanity (F4H) Initiative in direct partnership with Andrea Lundh and the Stockholm Initiative. The agreement stated areas of mutual interest read today as a description of the work this report records: food-trade logistics and supply-chain shock modeling; training practitioners in food-systems modeling and decision support with a focus on employability; strengthening African universities through joint curriculum development; establishing living-lab partnerships at African universities through Masters360; and opening joint funding and project opportunities.

1.2 Dakar and Marrakech

The Masters360 curriculum was co-designed in Senegal through the Dakar process. It brought together Senegalese academic, governmental, research and private-sector partners with Columbia faculty, including Dr James Hansen, Dr Sylwia Trzaska and colleagues from the International Research Institute for Climate and Society (IRI). The guiding discipline was simple: every module should answer a need named by the institutions that will own it.

The work continued at Marrakech on 3 June 2025, in a roundtable convened within the Mo Ibrahim Foundation (MIF) Governance Weekend, whose participants came from Columbia Climate School and Business School, the World Bank, UDS, ANSTS, Mohammed VI Polytechnic University (UM6P) and Al Moutmir.

The Marrakech Declaration that followed recognized, in its own terms, that the persistent gap in food systems does not reflect a lack of knowledge or commitment, but rather a failure to integrate knowledge, capacity, and implementation into coherent and operational systems [3].

Marrakech named what should converge; New York addressed who would do what, and how.

1.3 An architecture shaped with its partners

Masters360 was developed with its partner institutions over several years, rather than designed centrally and introduced to them. The distinction matters for the reason Chapter 3 draws from thirty years of field evidence: programs that national institutions adopt as their own tend to endure, and those brought in from outside tend to end with the funding that carried them.

The design began from what the partners named as their own needs. In each country, it was worked out with the national university, the research institute and ministries, and in the Global North with Columbia University, SLU and the network around the F4H Initiative, which contributed methods, modeling and curriculum experience. It was set against national research priorities and local conditions, the pastoral realities of the Ferlo in Senegal, the trimester structure UDS already runs in Ghana, the cashew chain in Côte d'Ivoire, so that what each institution would teach answered a need it had named.

Cooperatives were also invited to take part as parties to the design, not as subjects of it. This included village associations as well as larger federated unions with their own logistics, finance and quality systems. They brought into the curriculum what they look for when they hire, and where value leaves their chains. A program built only around the largest unions would not serve the smallest associations. A program built only around the smallest would not prepare graduates for the structures that move most of the value. Both were therefore kept in view. The private sector also took part. This included larger and smaller enterprises active in grains, cashew, cocoa, feed, dairy, seed production, horticulture and aquaculture.

The result is an architecture the partner institutions treat as their own, and Stockholm Initiative's role within it is a specific one: it convenes the partners, holds the architecture coherent across the three countries, and carries the common standard over time.

That continuity cannot be secured by any single university, ministry or funding cycle on its own.

The note for the next phase follows from this. The cooperative consultation should now be documented formally, cooperative by cooperative, country by country, with names, scales and service profiles recorded. That register will serve two purposes. It will evidence the depth of the design process to funders and partners. And it will become the first network of placement and applied research sites as the platforms scale.

2. The Diagnosis: Why Inputs Do Not Turn into Outcomes

As argued earlier, the problem is not that Africa lacks knowledge, capital or political will. It is that too little reliably converts those assets into practical capability where it is needed: on

farms, in value chains and inside ministries. That missing conversion is the subject of this chapter.

2.1 The evidence

The State of Food Security and Nutrition in the World 2025 records undernourishment in Africa above 20 percent, some 307 million people, with the cost of a healthy diet climbing faster there than in any region; on current projections, nearly 60 percent of the world's chronically undernourished will be African by 2030 [1].

Presenting the World Bank's analysis, Director Chakib Jenane set the opportunity beside the need: the continent holds 60 percent of the world's uncultivated arable land, its agribusiness market is projected at 1.3 trillion dollars by 2030, and food demand will rise by some 30 percent by 2050, while *"362 million young people will enter the workforce in the next decade"* against, on present trends, only about 150 million jobs [2].

Between the need and the opportunity stands the production floor he described: fertilizer use averaging 20 kilograms per hectare against 136 worldwide, cereal yields of 1.5 tonnes per hectare against 3.2 in India, only 20 to 30 percent of harvest value reaching the market, and food imports near 65 billion dollars a year and climbing.

He summarized that low productivity "*keeps food supply tight, keeps poverty high, and accelerates environmental damages"* [2].

2.2 The reading

These figures persist despite two decades of effort: several hundred billion dollars in national, multilateral and bilateral finance, a continental policy framework standing since the Maputo Comprehensive Africa Agriculture Development Programme (CAADP) commitments of 2003, and strong research outputs. The African Union's own biennial reviews nonetheless found no country on track for the Malabo targets by 2025, which prompted the ten-year strategy adopted at Kampala in January 2025 [4].

The shortfall is not explained by scarcity of inputs. It reflects, instead, fragmentation between research, policy and field implementation; the absence of a layer that converts knowledge and investment into applied capability; and a recurring misalignment with rural, pastoral and agropastoral realities.

2.3 The fertilizer chain

Professor Baethgen's keynote gave the session its clearest illustration of that missing layer.

He took the simplest field problem, an extension worker finding a crop short of nutrients, and traced the chain behind the obvious answer: basic research on plant physiology, the engineering of fertilizer, agronomic trials that calibrate rates by soil and climate,

recommendations, extension, and finally the farmer. His question was whether the links hold:

> *"Are these arrows that look so beautiful, are they working really in practice? Are knowledge really informing private sector practices… Are the field experiments informing real practical recommendations… Are those people translating and transmitting those messages to the farmers?"* – **Professor Walter E. Beathgen**

Too often, he said, the answer is no, and *"that beautiful knowledge just stays in these beautiful international peer review journals that are very far from reality."* The same question applies to whether the science informs the policy that governs fertilizer price, trade and subsidy, and there too "*in many cases… the answer is no."*

The conclusion the session drew is the analytical core of this report. Progress in any single domain, in isolation, does not produce systemic change.

Transformation requires platforms that combine education, applied research and field execution within one architecture.

3. The Decisive Lever: Extension, Training and the Missing Integrators

If the session pointed to one lever above the others, it was this. The World Bank's own analysis, as Director Jenane laid it out, breaks the human-capital constraint into four gaps that compound [2].

More than 70 percent of agribusiness firms cannot find workers with adequate technical and managerial skills, and extension reaches fewer than 10 percent of smallholders. Agribusiness is still seen as low-status work. Public extension is underfunded and thinly staffed. And the institutions responsible for agricultural education face a capacity deficit across departments.

His conclusion was blunt:

> *"If we don't address these four critical gaps, every dollar we put into infrastructure or finance will underperform."* - **Director Chakib Jenane, the World Bank Group**

Behind those gaps sits an institutional question that Professor Baethgen put to the universities directly: whether they reward the right work. Academic systems reward publication; they do not reward the integrators who connect research to agronomy, training, extension and policy.

> *"Are we rewarding the people that are able to integrate knowledge… And the answer is no,"* he said; "*it's very hard for a young person in the university to move up the ladder if that's the work that she or he does."* - **Professor Walter E. Baethgen**

The professionals who would staff the translation layer are therefore not formed, and his conclusion was that *"we need a platform to integrate all these processes,"* built deliberately because academic incentives will not produce it.

3.1 Thirty years of field evidence

Dr James Hansen set before the session a comparative record from three decades of curriculum and climate-services work across African extension systems, conducted through IRI.

In Senegal, a pilot trained 72 extension agents; the feedback was good, but, in his words, there was *"no real mechanism for sustaining it,"* and it ended with the project. The instructive successes came where national systems took ownership. In Kenya, the Ministry of Agriculture *"recognized this as something that they would like to own… took over ownership… and formally endorsed it"* across several line ministries. In Ethiopia, home to *"the largest public sector agriculture extension program in Africa,"* with 17 colleges training on the order of 7,000 extension workers a year, the government *"completely revamped their entire curriculum,"* adapting it across 11 different career path options to the point where the original materials are no longer recognizable. An outcome he called *"fully owned by the government."*

In Rwanda, by contrast, a legal separation between the agriculture ministry and the meteorological service blocked otherwise strong institutions. The lesson he drew is structural:

> *"For any curriculum or education initiative to have an impact… it has to be owned at the policy level as well as the university level,"* because *"policies and institutions at the national level don't necessarily follow project funding cycles."* — ***Dr James Hansen***

Beginning retirement, he placed his hope in Masters360 as a standing platform that arrives with what earlier projects lacked: institutional anchoring and policy-level ownership.

4. The Architecture: Platform and Operator

4.1 What Masters360 is

Masters360 is an education architecture, not a prescriptive coaching manual or a collection of generic instructions. Its fullest form is a two-year Master of Science in food and nutrition security, one hundred and twenty credits across four semesters, organized around four learning axes: the scientific foundations of resilient food systems; professional and community practice; advanced systems, governance and policy; and a final semester given wholly to a combined internship and thesis.

A bank of electives lets a student build a specialization, among them agribusiness and rural finance, food innovation and processing, climate and land resilience, nutrition and public health, agricultural policy and governance, and digital agriculture.

One discipline holds it together and is stated in a single figure: fifty percent theory, and fifty percent practice carried out on farms, in processing units, in cooperatives and in the institutions that govern food.

From that architecture, a family of programs has evolved, each built on the same spine and adapted to a country, an institution and an audience. The full Master of Science is the reference form. At the University for Development Studies (UDS) in Ghana, it will initially run as a six-month pilot, a practice-integrated enrichment track set alongside existing postgraduate degrees rather than replacing them. In Côte d'Ivoire, it takes a technical and vocational form, a TVET track anchored with INP-HB and built around the cashew innovation and technology center (CITA) at Yamoussoukro.

What stays constant is the spine: the same practice-to-theory balance, the same systems approach, and the same insistence that what is taught answers a need named by a partner institution. What varies is the depth, the duration and the audience.

The practical half is the spine. It is not an internship attached to a conventional degree.

Students learn through clinical courses on working land. They undertake supervised field immersion at partner farms and enterprises. They work on community case studies, where they diagnose a real problem and are held to what happens after diagnosis. They also carry out applied projects with local communities, private-sector partners and national and local ministries. This is supported by guest lectures from practitioners, study projects, simulations and structured games.

The UDS pilot shows the shape. It begins with a foundations block in systems thinking and leadership. It then moves into a tools-and-practice block, combining digital methods with a policy and market clinic and a partner-dialogue series. Students then complete eight weeks of full-time field immersion at the Yapei and Busunu clinical farm sites. The program closes with a capstone action project, presented and defended before a joint panel.

Five commitments run through the design.

First, it is transdisciplinary. It crosses agronomy, nutrition, economics, policy, climate, entrepreneurship and gender, rather than teaching them apart.

Second, it is co-created. It was worked out module by module with the universities, research institutes, ministries, cooperatives and enterprises that will use its graduates.

Third, it is practice oriented. It follows the principle set out in the diagnosis chapters: knowledge reaches a food system only when someone is trained to carry it there.

Fourth, it is multi-actor. It brings the national university, the research institute, the responsible ministry, cooperatives and the private sector into one program.

Fifth, it is South-South. It is built so that a solution proven in one partner country can travel to another, rather than being imported from the North.

Throughout, the test is employability. The combined internship and thesis, and the partner relationships behind them, are there so that a graduate leaves with a place in the system, not only a qualification. The first cohorts are set at parity: half women.

4.2 The Executive Program

Of the four human-capital gaps the diagnosis sets out in Chapter 3, one points inward, at the institutions meant to close the others.

As Director Jenane put it, *"And the institutions responsible for agricultural education face a capacity deficit across departments."* The deficit is not only in the students a faculty has yet to teach; it is in the faculty, the directorates and the serving professionals already in post, across every department that touches food. A two-year degree reaches the next generation. It does not reach the people who run the system today, and who will still be running it when that next cohort graduates. The Executive Program is built for them.

It is the condensed form of Masters360, built for people already in post: senior and mid-level officials in ministries of agriculture, teachers within faculties, managers in agribusiness and cooperatives, and executive leaders who set direction rather than enroll for a degree. It compresses the architecture into a six-week course of morning sessions, designed to sit beside a working week rather than interrupt it, and closes with a capstone and a certificate.

The six weeks move through the domains a food-system leader has to command: food-system dynamics, security and policy; soil, water and technology under a changing climate; agribusiness and market systems; trade, procurement and commodity pricing; youth, innovation and leadership; and governance and institutional effectiveness. It keeps the practice spine of the full program in condensed form, through real-world case studies, interactive workshops, simulations and role-play, and field learning, including a visit to a producing region. Cohorts are kept small, on the order of twenty, and alumni stay connected through the digital community after the course.

What the Program leaves behind is capability that outlasts the individuals trained: an institution with more of its own departments able to teach, advise and decide from the same systems understanding. It is designed to be replicable across a ministry's regions and adaptable to companies, academia and cooperatives, so that one format can serve a directorate, a firm or a federation without being rebuilt each time.

It is a point Director Jenane had made to the partnership before, in the discussion that followed the Stockholm Initiative's presentation of Masters360 to the executive board of the World Bank on 28 June 2024.

4.2 From architecture to platform

Masters360 rests on a set of principles meant to hold across the partner countries. It is modular and open, so parts can be adapted, replaced or added without rebuilding or weakening the whole. It is built to be replicated, and it carries its own measurement from the start rather than adding it afterwards. And it is held by the national institutions that host it rather than living in donor budget lines, the ownership principle set out in Chapter 1.

In each country, the architecture takes the form of a platform: a working arrangement in which the national university, the research institute, the responsible ministry and local enterprises meet around teaching, applied research and field work, set within national policy rather than alongside it. The form a platform takes follows the food system it serves. It can be a single site built on land, a center built on existing institutional and industrial infrastructure, or a network of operations distributed across a territory. What is constant is the function; what varies is the form, and that is part of what lets the architecture travel.

Across the partner countries the platforms are built to do the same six things: teach through practice, with clinical courses, internships and community problem-solving; carry out applied research at the sites; treat rural realties such as pastoral and agropastoral systems as part of the core rather than the margin; anchor the work in national universities and ministries; open routes into employment, enterprise and services; and feed what is learned back to government as a basis for policy.

Three platforms are now forming, each built on agreements already in place, and each at a different stage and in a different form.

4.2.1 Senegal

In Senegal, Masters360 is being anchored in the Agri-Innovation Hub at Dahra, in the pastoral Ferlo. The Hub is conceived as a territorial agropastoral platform rather than a private farm: an integrated, modular and replicable site bringing production, services, training, incubation and resource management together on roughly two hundred and thirty hectares, designed for the conditions that govern the Ferlo, a short rainy season, a long dry season, and a dependence on the Maastrichtian aquifer that makes water the binding question.

The Hub is under construction. What is already settled is the foundation beneath it. The Senegalese partners are in place; ANSTS, MASAE, ISRA and INP, under a cooperation agreement signed with the Senegalese state in December 2024. The groundwork is done, site visits, soil and water sampling, feasibility studies and technical exchanges with the research

institutes and technical partners. The site is positioned as a field translation of Senegal's own strategic architecture, from the agro-sylvo-pastoral framework law of 2004 through the Food Sovereignty Strategy for 2025 to 2034 to the current agricultural sector framework.

Its concept rests on four pillars. A productive base, organized around water control, coherent production systems and storage, built on alfalfa, maize, cowpea and sorghum in rotation and on drip-irrigated horticulture. A layer of economic and territorial services, supplying inputs, advice, equipment, animal health, logistics, packaging and market access to the producers and pastoralists of the surrounding territory. A function of training, incubation and skills development, where Masters360 enters the ground: practical training in real conditions in agronomy, livestock, irrigation, maintenance, management, quality and entrepreneurship, alongside incubation space for young agro-entrepreneurs and a coaching arrangement developed with Senegalese partners. And a discipline of governance, data and phased deployment, so that the site is piloted progressively, measured, and proven before it is replicated.

These pillars are joined by a Knowledge Hub linking the field, the services, the learning and the data, and it is here that the site and Masters360 become one thing rather than two. Its laboratories run simple water, soil, fodder and quality analysis and feed performance data back into both the teaching and the site's own decisions; its territorial kiosk carries advice, weather and market information and access to inputs and services out to surrounding producers; and its training function anchors Masters360 in working land. The diagnosis the Hub answers is the one the Ferlo has long carried: a sylvo-pastoral territory of underexploited potential, livestock held as a store of survival rather than as capital, unstable incomes and weak value capture, strong fodder demand met by fragmented markets, limited access to services, and an absence of reliable data. Because Dahra sits in the Ferlo, the Hub places pastoral and agropastoral systems at its center rather than at its margin, which is what ties it to the regional agenda set out in Chapter 6.

4.2.2 Ghana

In Ghana, the platform takes a different form: not a single site, but a network anchored on an existing university and the working farms around it. The University for Development Studies (UDS) in Tamale, founded to combine academic rigor with practical engagement in northern Ghana, is the academic and governance anchor; two commercial farms, Yapei Farm and Busunu Farm, are the clinical sites where students live and work; and a wider network of ministries, district assemblies, agribusiness firms and cooperatives supplies the applied projects and the placements.

The arrangement rests on a Memorandum of Understanding between UDS and Stockholm Initiative, coordinated through a Masters360 unit in the university's Faculty of Agriculture,

Food and Consumer Sciences, and it is carried at the level of national policy through the Presidential Initiatives in Agriculture and Agribusiness (PIAA).

The Ghanaian platform serves the two value chains set out in Chapter 5. In cocoa, national policy is moving from raw export to domestic processing, and the people who can run a processing or grading enterprise and meet a buyer's standard are suddenly in demand. In maize in the north, the loss is to post-harvest waste and to imports, and the work is in aggregation, drying, storage and grading to a domestic standard, with home-grown school feeding turning local graded maize into a market with a buyer and a price.

Its first form is the six-month pilot described earlier, an enrichment track running alongside existing postgraduate degrees, with a first cohort set at half women. The full Master of Science is intended to follow, owned and taught by UDS, with Stockholm Initiative holding the common standard across the three countries rather than teaching in any of them.

4.2.3 Côte d'Ivoire

In Côte d'Ivoire the platform takes yet another form, a center built on existing institutional and industrial infrastructure. The INP-HB anchors it academically through a newly proposed program built around CITA in Yamoussoukro, whose foundations the Masters360 work is helping to shape. With CCAK as the industry anchor for the cashew chain that are the platform's entry point.

The three platforms differ in form, by site, by center and by network, yet hold the same function, and it is on that layer that the cases in Chapter 5 build.

4.2 Food for Humanity and Masters360: One continuum

Professor Puma described Columbia's F4H Initiative as the science side of the same work, and its purpose plainly: *"we want to turn what we know into something that gets done. That's what we mean by translation."* He positioned the initiative as *"a node in a network of expert institutions,"* including the MIT Food and Climate Systems Transformation (FACT) Alliance, the Potsdam Institute for Climate Impact Research (PIK), Oxford University, Delft University, King Abdullah University of Science and Technology (KAUST) and the Global Alliance for Improved Nutrition (GAIN), and named Masters360 as its entry point to the human-capital layer the World Bank had identified.

The initiative rests on three pillars. Food-system dynamics is the study of how food moves and fails to move, illustrated with the disruption at the Strait of Hormuz and the 2021 Suez blockage and with trade-network and choke-point modeling built with Oxford and Delft.

The teaching point, he argued, is that students generally do not understand these dependencies, which is what the teaching is meant to change. Operational intelligence is decision platforms built with national institutions, exemplified by an early-warning pilot in

Haiti with the Rockefeller Foundation through GAIN that integrates local institutions' decision logic with AI and with data from the World Bank, WFP and FAO. Living labs are hands-on food production, at Columbia's Lamont campus and, by design, on partner platforms, on the view that anyone working in food systems needs a physical understanding of food.

The central institutional point of the session was that living labs and Masters360 are complementary parts of one architecture. Columbia brings the science, modeling and field experimentation; Stockholm Initiative brings the training systems, institutional anchoring and implementation; the African partners bring the ground, the ownership and the mandate.

Professor Puma closed on the teaching judgement he considers fundamental: food systems *"have been optimized for efficiency,"* and efficiency and resilience are often in tension, so *"finding the sweet spot is what we need to educate our students on."*

4.3 Who the platforms form

The platforms are built to form the people a working food system needs along its whole length, not graduates of agriculture in the abstract. Four roles are central, and they map onto the chain the diagnosis follows.

The researcher, who produces knowledge able to reach a field rather than only a journal. The extension or advisory worker, who carries it there, the role this report treats as the test of any research system. The enterprise operator, who runs a farm, a processing or grading business or a cooperative, meets the standard a buyer requires, and reads where value sits along the chain. And the public servant or analyst, who turns evidence into policy.

What the platforms teach, assess and certify is the capability each role requires rather than assumes. The purpose that joins them is constant: to keep more of the system's value, its work and its food in the country, whether by raising what the land yields, by capturing a margin that now leaves it, or by feeding people closer to where they live.

Dean Terry Ansah of UDS put the case from inside an African university. UDS has graduated agriculture students by the hundreds each year for more than three decades. But the north of Ghana, where his university sits, is among the poorest parts of the country and agriculture is its mainstay, which prompts his question: *"how is it that we do agriculture, but we are still poor, we are still hungry? There is something wrong somewhere we need to fix."* His students already spend a trimester in the communities identifying problems; what has been missing is the next step, *"what happens to those problems after they have been identified."* He described Masters360 as that step:

> *"We view this initiative not simply as another academic program, but as a platform for connecting academic learning, field-based experiences, applied research, innovation, entrepreneurship, and enterprise development… it is coming in with*

that missing gap." – **Professor Terry Ansah, Dean at the University for Development Studies**

UDS has signed a Memorandum of Understanding with Stockholm Initiative, and Dean Ansah found the alignment with government policy complete: "*we are on the right platform, we are in the right direction."*

4.4 Openness and financeability

Two properties of the architecture are the ones funders will test first. The first is openness: the design is modular, so new disciplines can enter running programs without rebuilding them. The first candidate identified in the session is climate-risk management in agriculture, which Professor Baethgen noted is absent *"from the curriculum of any university in any continent"* and on which IRI holds three decades of material; food law and regulation is a second. The second property is financial ability: the platforms are designed with defined cost structures, institutional roles and co-financing; as the principal Andrea Lundh stated, the work must be *"owned and run with where it's implemented"* rather than living in donor budget lines. Chapter 11 sets out the terms of support on that basis.

5. Value, Work and Food Kept at Home

This is where the mission becomes concrete, and these are the guiding principles the platforms are set for. Across the three countries, the same logic recurs: a food system gives up its value, its work and its food to others, and the platforms are built to keep more of all three at home.

A cash crop loses value downstream and abroad, where others process what is shipped raw, so recovery means moving up the chain. A staple loses ground to imports and to post-harvest loss, so recovery means growing the substitute and stopping the loss. Behind both sit the research that makes them possible and the policy that makes them national. The cases below, one in each country, show the people the platforms form and the work they do. These are serving as a few illustrative examples.

5.1 Cocoa in Ghana

Ghana grows some of the world's finest cocoa and has long shipped most of it as raw beans. That is changing by policy. Dr Otokunor described the decisions taken:

> "*We have decided that we are going to process about 50% of our cocoa… we have decided to ban the export of raw rubber… raw soybean*," with the aim "*to add value, get real value from the products and the raw materials that we produce, and in the process create jobs, create skills*." – **Dr Peter Boamah Otokunor, Director the Presidential Initiative for Agriculture and Agribusiness**

Those policy decisions create immediate demand for the people who can meet them: enterprise operators able to run a processing or grading business and satisfy a buyer's certification, the quality and food-safety specialists behind them, and the researchers and officials who set the standards and price origin. Anchored at UDS and PIAA, the cocoa case is where value capture is starkest: two countries grow close to two-thirds of the world's cocoa and keep a single-digit share of the wealth it creates. The value, and the work, are kept only where the enterprise that captures them is owned at home.

5.2 Maize in northern Ghana

In the same country and university, maize, the staple, loses value not abroad but to imports and to loss. Much of northern Ghana's maize is lost after harvest to poor drying, storage and contamination, and what survives is sold ungraded, while millers and the poultry-feed industry import a quality that could have been bought at home. The people the platform forms here work in aggregation, post-harvest handling and grading to a domestic standard. The gain is counted in food and livelihoods before margin: home-grown school feeding, the state buying local graded maize for its own schools, turns nutrition into an actual market with a buyer and a price.

5.3 Dairy in Dahra, Senegal

In Dahra, in the pastoral Ferlo, livestock and dairy lose value to imported milk powder, much of it fat-filled and sold below the price of local milk. The binding constraint is supply, which collapses in the dry season for want of feed and water, and the herd health that determines what an animal yields. That is already the applied research question the Dahra Hub faces, so in dairy the researcher is engaged from the start. But supply is held only when the pastoral communities are brought inside the enterprise rather than bought from at the gate: through feed and fodder systems that carry animals through the dry season, animal health and herd management, and cooperatives that organize herders into a reliable supply, with collection points close to the camps and the cold chain that carries fresh milk from a dispersed pastoral system to a processor without losing it on the way. Around that sit processing, food safety, and the enterprise and quality skills the chain runs on. La Laiterie du Berger, the Senegalese dairy that collects from Fulani herders in the Ferlo and processes for the domestic market, shows the chain can be held at home. The value, and the food, stay where the herders and the women who process own a share of the enterprise or cooperative; these are among the people usually left out of the formal chain.

5.4 Cashew in Côte d'Ivoire

Côte d'Ivoire is the world's largest producer of raw cashew, but shells only a small share at home. The logic is similar to cocoa: a crop the country dominates still leaves the country with most of its value added elsewhere.

Most of the harvest is shipped raw to Asia, principally Vietnam, for shelling. It is then re-exported to consumer markets in Europe and beyond. A nut grown in Côte d'Ivoire is therefore processed on another continent and eaten on a third.

That routing is increasingly difficult to defend, both economically and environmentally. Processing at origin would shorten the chain. It would keep the shelling margin and associated jobs in the country, while reducing the transport embedded in each nut.

Anchored with the CCAK and INP-HB at Yamoussoukro, the cashew case carries the same logic as coco as the parallel chain.

5.5 Staple substitution and heritage crops

The fourth loss is dietary, and it runs alongside the others. As imported rice and wheat displace millet, sorghum and fonio, West Africa loses three things at once: the market for its own farmers, the climate resilience of crops adapted to the Sahel, and the nutrition and food culture built around them. Between one third and two thirds of the cereals once grown at home are now bought from the market, and indigenous grains are leaving fields and curricula together.

A case here is not value capture but substitution: forming the agronomists, processors and enterprises that can put fonio and the coarse grains back into local diets and local markets, where they feed people and hold value that imports now carry off. It is the mission stated in food rather than margin.

6. Pastoral Systems and the Nouakchott Agenda

This chapter is addressed as much to the World Bank as to the academic partners, because it shows the collaboration already standing on the concrete side of an agenda the Bank has supported for over a decade.

The Nouakchott Agenda is a World Bank supported regional framework that emerged from high-level discussions in Nouakchott to accelerate economic transformation across the Sahel and West Africa by linking investment, human capital, agricultural modernization, private sector development and regional integration into a single implementation agenda

In Sahelian West Africa, pastoral and agropastoral systems are central to food security, land use, livelihoods, climate adaptation and stability. The heads of state of six Sahelian countries, Senegal among them, recognized this in the Nouakchott Declaration on Pastoralism of 29 October 2013, with the World Bank as a principal partner; it was made operational through the Regional Sahel Pastoralism Support Project (PRAPS), a 248-million-dollar program coordinated by CILSS, later renewed [5].

In November 2024 the Nouakchott +10 Forum renewed the commitment across fifteen countries, now including Ghana and Côte d'Ivoire, with emphasis on youth and women [6].

The Agro-Innovation Hub at Dahra sits inside this agenda. Dahra is a historic livestock research site in the Ferlo, and the platform's first applied-research question, the health and governance of the groundwater on which pastoral mobility depends, addresses the binding resource, while its training mission addresses the binding constraint a decade of PRAPS has exposed, which is human capability.

As AgriConnect absorbs and scales the Bank's pastoral engagement, the partnership offers instrumented ground in exactly the systems the Nouakchott process designated. The same logic aligns the platforms with the Kampala CAADP Declaration of January 2025, which commits African states to raise agrifood output by 45 percent, triple intra-African trade, lift locally processed food to 35 percent of agrifood GDP and mobilize 100 billion dollars [4]. Ghana's cocoa-processing decision is that the processing target is taken as national policy.

7. A Convergence of Stakeholders

The significance of the session lay less in any one statement than in who was in a position to act on it. The handoff the diagnosis identifies, between research, financing, policy authority and teaching, cannot be designed while the parties on either side of it are not in contact.

The session brought that full set together: the World Bank at the level where financing decisions are taken, through its Regional Practice Director for the Planet Department in Western and Central Africa; the Office of the President of Ghana through PIAA; Senegal's research system through the directors general of ISRA and INP; and the partner universities, with SLU and Columbia University, through their deans and faculty. Among the participants were Professors Ruth DeFries of Columbia, Glenn Denning of its School of International and Public Affairs, and Jess Fanzo of Johns Hopkins, founding director of Columbia's Food for Humanity Initiative.

7.1 AgriConnect, and where the work converges

Director Jenane presented AgriConnect, a World Bank initiative launched in October 2025 with the African Development Bank (AfDB), the International Fund for Agriculture Development (IFAD), the Islamic Development Bank (IDB) and partners including OCP, Bayer and the Gates Foundation, "*built around one single ambition, supporting 300 million farmers to move up the value chain by 2030."*

It is organized around three pillars, foundations, policy reform and capital mobilization, and Director Jenane stressed, *"under AgriConnect, skilling, research and development, and extension are seen as key."* On financing, the Bank intends to move from a 4.5 billion investment per year to 9 billion per year, with a further 5 billion mobilized; on delivery, it

negotiates compacts country by country, with eight approved and around eleven more in discussion [2].

Two of his points bear directly on this partnership. The first is that the Bank's intended education model is the one these platforms are built on: a shift "*from a traditional academic model to a practice-oriented one*," with "*farm-based learning and internships, a competency framework co-designed with industry*," and technical and vocational education and training (TVET) repositioned "*as a real pathway into agribusiness*." He noted that this is what he sees that *"Stockholm Initiative is trying to promote with several universities in Africa*." The second is the place he gave to knowledge partners:

> *"We need knowledge partners to come into AgriConnect to share their knowledge, expertise, research, data, and insight."* – **Director Chakib Jenane, the World Bank Group**

Director Jenane closed on the question the session had gathered to discuss: *"The human capital layer is part of this plan, and I would say most at risk of [under]performing, and this room is best positioned to help design and drive forward."*

What that pillar represented was put most plainly not by the hosts but by Lotfi Maktouf who has served as a senior counsellor at the IMF *"This is the first time I hear a World Bank presentation acknowledging and talking about knowledge partners and having their column for knowledge partners. This is absolutely new."* a recognition, he added, *"of the value, precisely, of knowledge, of research, of academia."*

The principle by which it should be filled was raised in the room by Professor Jennie Barron of SLU, who cautioned that knowledge partnership should not reproduce the geography it means to correct: it is valuable, she said: "*to have excellency knowledge partners from the regions where the focus is… not just the northern European and US"* institutions, so that centers such as UDS, ISRA, INP, INP-HB are reflected *"more broadly and more inclusively."*

8. Proceedings: The New York Sessions

This chapter records the session in sequence. The institutional and keynote contributions are summarized in Chapters 2 to 4 and 7 and are not repeated here in full; what follows captures the remaining substance and the open discussion.

8.1 The Republic of Ghana

Dr Peter Boamah Otokunor, who advises the President of Ghana and directs PIAA, presented Ghana's Agriculture for Economic Transformation Agenda (AETA) and its five pillars: food security; youth and women's employment; value addition; climate resilience; and rural economic growth. His central argument was that the education question must be reframed whole: *"we need to rethink the entire knowledge value chain,"* formal and informal together,

with entrepreneurial formation, data literacy and problem-solving embedded, *"because there are people of age that have gone beyond formal education."*

He placed markets at the center: *"the challenge with agriculture mostly has been the market structures… we don't really link the production to the food system; the food needs of the country,"* and *"that is at the heart of food security."* He set Ghana's paradox plainly, that it is among the most educated countries in the region, yet industry finds graduates falling short, and located Masters360 as the answer to that gap. He noted that *"almost all the universities in Ghana"* are now encouraged to develop practice-oriented agribusiness programs, pointed to Ghana's existing relationship with the World Bank through the Food System Resilience Program (FSRP), and said Ghana *"will be very glad to get World Bank on board with this mission."*

8.2 The World Bank presentation

Director Jenane's presentation of AgriConnect is set out in Chapter 7. Two further elements belong to the record. The first is the principle governing delivery: *"intervention[s] are only durable when they connect. Yield improvement is wasted if a farmer cannot sell at a fair price, and the market is useless if the road to it does not exist."* The second is his treatment of jobs, which he asked the room to plan against. The agrifood transformation could generate, on estimates consolidated across agencies, 80 to 100 million jobs in on-farm production, 25 to 35 million in agro-processing, 8 to 12 million in logistics, 5 to 8 million in digital agriculture and 6 to 10 million in the green economy, each requiring its own skills [2]. His instruction followed from the numbers: "*workforce planning has to happen at the node level, not as [a] generic agriculture skills program,"* and *"co-developed in partnership with industry."* That is the level at which Masters360 curricula are designed.

8.3 Columbia and Masters360

Professor Puma and Andrea Lundh presented the two halves of the single architecture set out in Chapter 4. Responding to Dean Ansah, Professor Puma noted that the move beyond identifying problems to solving them was one Columbia itself could learn from, and that working it through together would benefit both sides.

8.4 Open discussion

The discussion produced commitments of its own. Dr James Hansen's account of thirty years of curriculum work is set out in Chapter 3. The Dahra site director Dr Sega Ndao proposed beginning the platforms' cooperation at regional level, with Ghana and Senegal exchanging experience *"to see where is the real gap,"* and Dean Ansah, recalling earlier joint work on livestock emissions, agreed they were *"ready to work… in that area."* ISRA placed its institutional support on record through its senior representative Dr Aliou. The Columbia Center on Sustainable Investment (CCSI), through Dr Esther Akwii and Dr Lara Fornabaio, opened a concrete line: an applied-research group that works directly with stakeholders on

investment pathways and policy, currently on the enabling environment for AI for smallholders in Sub-Saharan Africa, and proposed that the partners jointly fundraise and run a project together.

A Columbia Climate School student proposed regular living-lab video links between New York and partner campuses to build relationships among students; the idea was taken up at once as low-cost and replicable, and Dr Sari Blakeley noted that Climate School master's students must complete summer research, citing a current project on flood anticipatory action in Burkina Faso, which can be mapped onto platform research needs.

Professor Baethgen gave the South-South principle its closing illustration in the Gates Foundation's designation of Uruguay as an observatory for sustainable livestock production: when a country facing a challenge *"look[s] for a solution in Germany, you feel like you're so far,"* but a solution proven in another developing country *"it's a lot more effective."*

The session closed with Professor Puma proposing a standing advisory council to keep the group engaged.

9. The Measure

The platforms are intended to be measured as a function running inside the work rather than a report written afterward, for two reasons: a platform that does not measure what it produces cannot improve it, and measurement is what a funder is in effect buying, the assurance that money became capability. Stockholm Initiative and the Food for Humanity Initiative treat monitoring as a method, holding two functions distinct.

Decision-centered monitoring produces timely evidence on whether an intervention performs as intended; institutional uncertainty processing governs how that evidence is read when signals are incomplete or contested. Indicators are kept few and decision critical, reviews run on a fixed cadence inside the host institution, and the monitoring is itself examined for indicator bias and reporting delay rather than assumed neutral.

The intention is to measure not the proxy but the purpose: the value an operator captures and keeps, the enterprise started, the jobs created, the margin moved from raw export to finished product, the import displaced. Joined to Columbia's operational-intelligence work, the data can in time tell a government and a financier where the binding human-capital constraint sits, node by node.

One discipline follows from the ownership lesson: the protocol is designed and stewarded by Stockholm Initiative, but it sits with the institutions, not above them. Stockholm Initiative's role here is the guarantor's, to carry a common standard across the three countries; a measurement layer pointed at the partners from outside would reproduce the arrangement this work exists to end.

10. Next Steps and Commitments

The session's outputs are sequenced, owned and dated.

Within 30 days

- Circulate this report and the draft New York Declaration to all participants for review, discussion and ultimately written endorsement.
- Constitute the advisory council proposed in the closing session, broadening the group while preserving decision capacity.
- Continue the conversation with the World Bank. AgriConnect's agenda and the partnership's work are aligned; the next step is to keep the exchange open. On AgriConnect's knowledge-partner pillar, the partners hold to the principle raised in the session, that African centers of excellence such as UDS, INP and ISRA belong in it in their own right.

Within 90 days

- Define the first co-taught module, climate risk management in agriculture, a subject absent from curricula on any continent and one where IRI holds three decades of material, for adaptation and ownership by UDS, the Senegalese platform and INP HB.
- Establish the recurring living lab link: greenhouse to campus sessions connecting New York, Tamale, Dahra and Yamoussoukro.
- Map Columbia Climate School summer project requirements onto platform research needs, on the model of the Burkina Faso flood anticipatory action collaboration.

Within 12 months

- Draft the joint analytical paper synthesizing rationale, institutional expertise and implementation pathways, as the instrument of engagement with governments, donors and strategic partners.
- Scope two applied research lines to full proposals: groundwater monitoring and governance at the Dahra platform, and the CCSI line on investment frameworks and the enabling environment for AI for smallholders, with joint fundraising.
- Structure the South-South exchange program across the three platforms, drawing on the Uruguay sustainable livestock observatory as precedent.
- Design and pilot the food law module at UDS as the proof case of the architecture's openness.

Within 24 to 36 months

- Adopt a jointly endorsed operational roadmap defining priority geographies, pilot platforms, governance and financing logic, designed from the outset for bankability and replicability.
- Convert the first research lines into operational services: the Dahra groundwater work into a water governance service for the Ferlo; early warning prototypes into national decision support; node level skills mapping into accredited training pathways.

A standing Masters360 rule governs the whole: every research line is designed from inception to become an operational endeavor, and every operational lesson is returned to the curriculum. The platforms learn in both directions.

11. The Investment Case

This chapter sets out the terms on which the partnership invites support from governments, multilateral institutions, foundations and private partners. It rests on five points, each grounded in the New York session.

First, the binding constraint is identified and investable. The World Bank's own analysis is that without the human-capital layer, "*every dollar we put into infrastructure or finance will underperform*" [2]. The platforms are intended to be that layer.

Second, the demand is large. AgriConnect alone intends to move 9 billion dollars a year, plus 5 billion mobilized, and the agrifood transformation is estimated to require well over a hundred million skilled workers across its nodes [2]; the Kampala commitments add a continental policy framework pointing the same way [4]. Each target is a demand for the operator the platforms aim to form.

Third, the model is built to last beyond funding cycles. The platforms are embedded in national universities and ministries; curricula are owned where they are taught, the lesson Dr Hansen drew from Ethiopia and Kenya; monitoring is built in; and replicability is a design principle, with what runs in Tamale intended to adapt to Dahra and Yamoussoukro.

Fourth, the partnership combines capacities no single institution holds: Columbia's science, modeling and network; Stockholm Initiative's architecture, African relationships and implementation; and the African partners' ownership and mandate. The configuration in the room, a financier, a presidency, research directors general, deans and faculty at one table, is part of what makes the work credible.

Fifth, the returns are intended to be measurable and public: operators placed, extension agents trained and retained, enterprises created, research converted into services, each reported against indicators set at design.

Support can take the form of core funding to a national platform, sponsorship of a curriculum module, financing of an applied-research line through to service, or support to the exchange between platforms. Full-cost proposals follow from the twelve-month commitments of Chapter 10 and are available from Stockholm Initiative and the Food for Humanity Initiative jointly.

12. Risks and Execution Discipline

The risks that have limited similar efforts are recurring patterns; the participants are aware of such risks and the session addressed each.

- **Engagement without follow-through.** The platforms are intended as operational entities with sites, staff and programs, not collaborations awaiting application; the early-stage caveat in Chapter 4 is stated plainly so that progress is measured against it.
- **Premature scaling.** Three platforms are to be consolidated before any extension, with regional reach achieved through them rather than around them, the approach Dr Sega Ndao, Director at ISRA CRZ Dahra .
- **Institutional fragmentation.** Structured governance, clear roles and the advisory council are intended to hold the partners together.
- **Financing misaligned with operations.** The platforms are designed with defined cost structures, measurable outcomes and co-financing from the outset.
- **Underestimation of pastoral systems.** These are treated as central, anchored at Dahra and aligned with the Nouakchott agenda.
- **Failure to design for replicability.** Replicability is a design principle, with documented adaptation across the three countries.

The common answer is execution discipline: clear ownership, structured governance, phased validation, and the integration of training, field deployment and institutional coordination within one system.

Conclusion

This report records a point of transition. The intellectual foundation has been built, in Dakar, in Marrakech and in New York; the partnership framework is in place; and the platforms are forming in three African countries. The World Bank's direction and the partnership's work point the same way, and the conversation among them continues.

The credibility of the work will be determined not by the quality of its design but by whether it produces functioning systems on the ground: trained people in real jobs, research turned into services, institutions strengthened where they stand.

The participants committed to that test, and this report is the record of that commitment and an invitation, to governments, institutions, foundations and partners, to take the next steps with us.

Sources and Notes

[1] FAO, IFAD, UNICEF, WFP and WHO, The State of Food Security and Nutrition in the World 2025, Rome, 2025; African regional figures as presented at the UN Food Systems Summit Stocktake, July 2025.

[2] World Bank Group, AgriConnect: Growing Food, Creating Jobs, presentation by Chakib Jenane to the Working Session on Food System Education and Operational Platforms in the Global South, Columbia University, New York, 11 June 2026. Quotations of Director Jenane, and the figures attributed to him, are drawn from the session recording; jobs estimates therein are consolidated from AfDB, AGRA, FAO, IFPRI, ILO and WBG sources.

[3] The Marrakech Declaration on Food System Transformation, Knowledge Integration and Operational Deployment, Marrakech, 3 June 2025.

[4] African Union, Kampala CAADP Declaration and CAADP Strategy and Action Plan 2026–2035, adopted January 2025.

[5] Nouakchott Declaration on Pastoralism, 29 October 2013; World Bank Regional Sahel Pastoralism Support Project (PRAPS), coordinated by CILSS, 2015 and successor phase.

[6] Nouakchott +10 High-Level Forum, November 2024.

A note on sources. Direct quotations in this report are taken from the recording of the working session of 11 June 2026 and have been lightly edited only to remove spoken disfluencies, without change of sense.

Annexes

The annexes assemble the primary record on which this report rests: the agenda as convened, the full participation list, a summary of the Marrakesh Declaration, the New York Declaration and a glossary for this report.

Annex A. Working Session Agenda, 11 June 2026

Food Systems Education and Research in the Global South: From Academic Collaboration to Field Based Operational Platforms. Hosted by the Stockholm Initiative for Food Security in collaboration with the Columbia Climate School, Columbia University, New York. Closed strategic workshop, 09:00 to 12:00, followed by a working lunch. Chair: Professor Walter E. Baethgen. Co leads: Professor Michael J. Puma and Andrea Lundh.

- 08:45 to 09:00. Arrival and registration.
- 09:00 to 09:10. Opening and welcome. Professor Michael Puma and Andrea Lundh. Institutional framing and the morning's logic, from academic collaboration to field based operational platforms.
- 09:10 to 09:30. Distinguished institutional perspectives: why practice-oriented food systems platforms matter now. Chakib Jenane, World Bank, and Dr. Peter Boamah Otokunor, Office of the President, Republic of Ghana.
- 09:30 to 09:45. Keynote framing: from knowledge to operational capability. Walter E. Baethgen.
- 09:45 to 10:10. Session 1. Challenging the current food systems narrative: from knowledge and investment to operational capability.
- 10:10 to 10:35. Session 2. The Columbia Food for Humanity Initiative: scientific framing, living labs, field-based knowledge systems. Professor Michael Puma.
- 10:35 to 10:50. Coffee break.
- 10:50 to 11:20. Session 3. Masters360 as a joint operational asset: from training model to platform architecture. Andrea Lundh with invited Masters360 partners.
- 11:20 to 11:50. Session 4. Joint operational axes for collaboration: what should be taken forward. Structured plenary.
- 11:50 to 12:00. Closing synthesis and follow up process. Walter E. Baethgen.
- 12:00 to 13:00. Working lunch: institutional value, strategic fit, and the first 30 days.

Annex B. List of Participants

On site, Columbia University, New York.

- Dr. Walter E. Baethgen. Senior Research Scientist, Columbia Climate School and the International Research Institute for Climate and Society, Columbia University. Chair.
- Professor Michael J. Puma. Professor of Climate; Director, Center for Climate Systems Research; Director, Food for Humanity Initiative, Columbia University. Co-lead.
- Andrea Lundh. Founding Member and President, Stockholm Initiative for Food Security. Co-lead.
- Dr. James E. Hansen. Director, Climate Science, Awareness and Solutions, Columbia Climate School.
- Dr. Lara Fornabaio. Lead Researcher, Columbia Center on Sustainable Investment, Columbia Climate School.
- Lotfi Maktouf. Principal Advisor, Stockholm Initiative for Food Security and Masters360.

Online.

- Professor Ruth S. DeFries. University Professor and Professor of Ecology and Sustainable Development, Columbia University.
- Professor Glenn L. Denning. Professor of Professional Practice in International and Public Affairs, Columbia University.
- Professor Jess Fanzo. James Anderson Professor of Food Policy and Climate, Johns Hopkins School of Advanced International Studies, Johns Hopkins University.
- Dr. Esther Akwii. Senior Legal Researcher, Columbia Center on Sustainable Investment, Columbia Climate School.
- Dr. Sari Blakeley. Associate Research Scientist, National Center for Disaster Preparedness, Columbia Climate School.
- Dannie Dinh. Program Manager, Food for Humanity Initiative, Columbia Climate School.
- Chakib Jenane. Regional Practice Director for the Planet Team, Western and Central Africa Region, World Bank.
- Paulo Gomes. Chairman, Paulo Gomes and Partners; former Executive Director, World Bank Group.
- Dr. Peter Boamah Otokunor. Director, Presidential Initiatives in Agriculture and Agribusiness, Office of the President, Republic of Ghana.
- Emmanuel Owusu. Advisor, Presidential Initiatives in Agriculture and Agribusiness, Republic of Ghana.
- Professor Terry Ansah. Dean, Faculty of Agriculture, Food and Consumer Sciences, University for Development Studies, Ghana.
- Dr. Moustapha Guèye. Director General, ISRA, Institut Sénégalais de Recherches Agricoles.
- Dr. Aliou Faye. Director, ISRA Dakar, Senegal.
- Dr. Séga Ndao. Director, ISRA Centre de Recherches Zootechniques, Dahra, Senegal.
- Dr. Alfred Kouly Tine. Director General, Institut National de Pédologie, Senegal.
- Daouda Sangaré. Technical Advisor and Agribusiness and Industrial Development Specialist, Côte d'Ivoire.
- Professor Jennie Barron. Professor of Agricultural Water Management, Swedish University of Agricultural Sciences (SLU).

• Dr. Johan O. Karlsson. Researcher in Agricultural Technology and Systems, Swedish University of Agricultural Sciences (SLU).
• Ylva Cederskog. Chair of the Board, Stockholm Initiative for Food Security; Sales Specialist, Lantmännen.
• Peter de Jounge. Board Member, Stockholm Initiative for Food Security; Marketing Executive, Tetra Pak.
• Hedvig Tindberg. Officer, Stockholm Initiative for Food Security.
• Ms. Paola De Caro. Former Team Leader, DG Agriculture and Rural Development, European Commission.
• Ms. Emilia Eka. Departmental Secretary, Ministry of Finance, Government of Sweden.

Annex C. The Marrakech Roundtable, 3 June 2025

Reflections on the Stockholm Initiative Roundtable on Capacity Development and Knowledge Sharing in the Fight against Nutrition and Food Insecurity in Western Africa, held within the Mo Ibrahim Foundation Governance Weekend, Marrakech, and submitted by Andrea Lundh, President of the Stockholm Initiative and organizer of the roundtable. The note records six themes, reproduced here in summary as the immediate antecedent of the New York session.

- Employability as a core pillar. Employability lies at the heart of current development discourse, including the World Bank's strategic framework, and aligns directly with the Masters360 curriculum, which integrates clinical, real-world learning in response to labor market demand.
- The strategic value of clinical programs. Academic institutions must connect directly to productive sites, enabling a meaningful link between theory and practice, between desk and farm.
- A holistic approach: breaking silos to build systems. Agricultural training is too often fragmented into disconnected streams; Masters360 encourages transdisciplinary integration and cross sector collaboration.
- Digital technology as a game changer. No modern extension service or agronomic training effort can succeed without full integration of digital tools, from marketplaces and extension platforms to training and community engagement.
- Re-centering the community. Agricultural development must be anchored in the community, respecting local values, engaging youth and women, and understanding socio-economic realities.
- South-South cooperation in action. The note cites the emerging UM6P and Senegal partnership and the Stockholm Initiative's support for exchange between Angolan and Brazilian youth in clinical farm schools, as a model for scaling and replication.

The roundtable's speakers included Professor Walter Baethgen, Director Chakib Jenane, Professor Coumba Touré Kane of ANSTS, Professor Terry Ansah, Professors of UM6P's Africa Business School and Columbia Business School, the head of Al Moutmir, and Andrea Lundh, President for the Stockholm Initiative. The roundtable's call for deliberate convergence between research, knowledge exchange and field deployment, the informally named Marrakech Declaration, is the commitment that the New York workshop set out to execute.

Annex D. The New York Declaration

As circulated to participants for written endorsement within 30 days of the workshop.

Modeled as the formal successor to the Marrakech Declaration.

THE NEW YORK DECLARATION

On Food Systems Education and Field Based Operational Platforms in the Global South.
Columbia University, New York, 11 June 2026.

We, the undersigned participants of the New York workshop convened by the Stockholm Initiative for Food Security and the Columbia Climate School,

Recalling the Memorandum of Understanding between Columbia University and the Stockholm Initiative for Food Security, the Dakar curriculum process, and the roundtable held in Marrakech on 3 June 2025 within the Mo Ibrahim Foundation Governance Weekend, whose conclusions called for deliberate convergence between research, knowledge exchange and field level deployment,

Observing that one in five Africans, 307 million people, faced hunger in 2024, that 362 million young people will enter the workforce in the coming decade against 151 million jobs on current trends, that public extension reaches fewer than one in ten smallholders, and that more than seven in ten agribusiness firms cannot find workers with the skills they need, while the continent holds the world's largest reserve of uncultivated arable land and a projected 1.3 trillion dollar agribusiness market by 2030,

Affirming that the constraint is therefore not the availability of knowledge or capital but the absence of systems that convert them into operational capability,

Welcoming the World Bank's AgriConnect initiative, its ambition to support 300 million farmers up the value chain by 2030, its commitment to practice oriented education within country compacts, and its explicit recognition of knowledge partners as a pillar of agricultural transformation,

Recalling further the Nouakchott Declaration on pastoralism and its renewal by the countries of West Africa and the Sahel, and the Kampala CAADP Declaration of January 2025, which placed agrifood systems, skills and youth at the center of continental commitments,

Declare as follows:

1. Education and training stand at the core of food systems transformation. Training is central to every reform, from input systems to farm productivity to value addition. No financing strategy will deliver durable results without a skilled, job ready, field tested workforce.
2. The missing layer between knowledge, investment and outcomes is operational. We commit to building and operating the translation layer through integrated platforms that join academic instruction, field immersion, applied research, policy engagement and employability.
3. Extension and advisory services are a decisive lever. We commit to strengthening them through practice oriented curricula, in service training and institutional ownership at both university and ministerial level, drawing on documented experience from Senegal, Ghana, Kenya and Ethiopia.
4. Skills shall be developed where the jobs will be, node by node along the value chain, from on farm production to processing, logistics, digital agriculture, finance and the green economy, through training pathways co designed with industry.
5. Masters360 and the Food for Humanity Initiative are complementary components of a single architecture, joining living lab science to capability formation, and are jointly available to governments and partners as an operational asset, including within AgriConnect country compacts.
6. Ownership belongs in Africa. The platforms are anchored in national universities and institutions in Senegal, Ghana and Côte d'Ivoire, and African centers of excellence shall stand as knowledge partners in their own right, in full South South reciprocity, alongside their Northern peers.
7. Pastoral and agropastoral systems are central, not peripheral, to food security in the Sahel. We commit to integrating them in platform design and to advancing, from the Dahra platform in Senegal, the human capital dimension of the Nouakchott objectives.
8. The architecture shall remain open. New disciplines, beginning with food law and regulation, shall be integrated into running programs as needs emerge, so that curricula evolve with food systems rather than behind them.

9. We commit to a jointly endorsed operational roadmap within the coming year, defining priority geographies, pilot platforms, governance, measurable outcomes and financing logic designed for bankability and replicability.
10. We invite governments, multilateral institutions, foundations, universities and private sector actors to join this undertaking, and we offer the New York process as a standing interface between science, policy and the field.

Adopted at Columbia University, New York, this 11th day of June 2026.

Annex E. Glossary of Institutions, Frameworks and Terms

A reference key to the institutions, programs, frameworks and technical terms named in this report. Where an acronym is in common use, it is given alongside the full name.

E.1 The partnership

Stockholm Initiative for Food Security. Swedish nonprofit that convenes the partnership and developed the Masters360 architecture with its African and Columbia partners. Led by Andrea Lundh, President and Founding Member.
Masters360. The practice-driven, modular education architecture at the center of this report. Co-designed with the institutions that own it, anchored in national universities and ministries, and built to convert knowledge into operational capability.
Translation layer. The report's central concept. The institutional, pedagogical and operational mechanisms that convert research, policy and capital into applied capability on farms, in value chains and in public institutions. Its absence is the diagnosis at the center of Chapters 2 and 3.

E.2 Columbia University entities

Columbia Climate School. Columbia University's school for climate and sustainability. Institutional home of the partnership on the Columbia side.
Food for Humanity (F4H) Initiative. Climate School initiative directed by Professor Michael J. Puma. Supplies food-system dynamics, operational intelligence and living labs to the partnership.
Center for Climate Systems Research (CCSR). Columbia research center, also directed by Professor Puma.
International Research Institute for Climate and Society (IRI). Columbia institute with three decades of climate-services and curriculum work in African extension systems. The base of Professor Baethgen's tenure and the field record presented by Dr. Hansen.
Columbia Center on Sustainable Investment (CCSI). Columbia applied-research center working on investment pathways and policy, including the enabling environment for AI for smallholders. Represented by Dr. Esther Akwii and Dr. Lara Fornabaio.
Lamont campus. Columbia's Lamont-Doherty site, which hosts the living-lab food production described in Chapter 5.

E.3 Multilateral and financial institutions

World Bank Group (WBG). Multilateral financier and sponsor of AgriConnect. Represented at the working session at decision level by Chakib Jenane, Regional Practice Director for the Planet Team, Western and Central Africa.
AgriConnect. The World Bank Group flagship initiative, presented under the banner Growing Food, Creating Jobs. It aims to move 300 million farmers up the value chain by 2030, doubles WBG agribusiness financing to 9 billion dollars a year by 2030, and names knowledge partners as a pillar of agricultural transformation.
Country compact. The AgriConnect implementation instrument. A tailored plan negotiated government by government, each lifting policy bottlenecks and each containing an explicit education agenda. Senegal, Guinea and Ghana are among the first movers.
IDA (International Development Association). The World Bank Group's concessional financing arm, used within AgriConnect to de-risk private investment.
African Development Bank (AfDB). Regional development bank, AgriConnect partner, and source for several jobs, import and Feed Africa figures cited in the annexes.
IFAD (International Fund for Agricultural Development). United Nations financial institution for rural development. A co-publisher of SOFI and an AgriConnect partner.
Islamic Development Bank. Multilateral AgriConnect partner.

E.4 African universities, research institutions and authorities

Institut Sénégalais de Recherches Agricoles (ISRA). Senegal's national agricultural research institute. Director General Dr. Moustapha Guèye; Dr. Aliou Faye directs the Dakar center.
Institut National de Pédologie (INP). Senegal's national soil-science institute. Director General Dr. Alfred Kouly Tine.
National Academy of Sciences and Technology of Senegal (ANSTS). Senegal's national academy. Partner in the Senegal platform; represented at Marrakech by Professor Coumba Touré Kane.
ISRA Centre de Recherches Zootechniques, Dahra. Historic livestock research station in the Senegalese Ferlo, directed by Dr. Séga Ndao. The physical site of the Agro-Innovation Hub.
Agro-Innovation Hub, Dahra. The platform taking shape at Dahra. Its first applied-research line is the health and governance of the Sahelian groundwater on which agropastoral life in the zone depends.
University for Development Studies (UDS), Tamale, Ghana. The northern Ghana University where Masters360 runs deepest. Operates the country's only trimester system, with a full term of community immersion. Dean of the Faculty of Agriculture, Food and Consumer Sciences, Professor Terry Ansah.
Institut National Polytechnique Félix Houphouët-Boigny (INP-HB). Polytechnique in Yamoussoukro anchoring the Ivorian platform.
Conseil du Coton, de l'Anacarde et du Karité (CCAK). Côte d'Ivoire's cotton, cashew and sheabutter authority, the public body governing the value chains.

E.5 Government bodies and national agendas

Presidential Initiatives in Agriculture and Agribusiness. Program of the Office of the President of Ghana, which has signed a Memorandum of Understanding with the Stockholm Initiative around Masters360. Director Dr. Peter Boamah Otokunor.

Agriculture for Economic Transformation Agenda. Ghana's national agenda presented by Dr. Otokunor. Five pillars: food security; youth and women's employment; value addition and competitive agro-industry; climate resilience; and rural economic growth.

E.6 Northern, global and knowledge-network partners

Swedish University of Agricultural Sciences (SLU). Swedish agricultural university and consultation partner. Professors Jennie Barron and Johan Karlsson took part in the working session.
UM6P (Mohammed VI Polytechnic University) and its Africa Business School. Moroccan university and business school; participants in the Marrakech roundtable.
Al Moutmir. The farmer-support and extension program of OCP in Morocco. Marrakech participant.
OCP. Morocco's phosphate and fertilizer group, the Office Chérifien des Phosphates. An AgriConnect value-chain integrator.
Mo Ibrahim Foundation. Convener of the Governance Weekend in Marrakech that hosted the Stockholm Initiative roundtable of 3 June 2025.
MIT FACT Alliance. The MIT-led Food and Climate Systems Transformation Alliance, part of the Food for Humanity network.
Potsdam Institute (PIK). The Potsdam Institute for Climate Impact Research, Germany. A price-modeling partner in the network.
KAUST. King Abdullah University of Science and Technology, Saudi Arabia. A network partner.
GAIN (Global Alliance for Improved Nutrition). Partner, with the Rockefeller Foundation, in the Haiti early-warning pilot.
Rockefeller Foundation. Co-funder of the Haiti early-warning pilot referenced by Professor Puma.
AgriConnect knowledge partners. The four institutions currently named in the AgriConnect knowledge pillar: CGIAR, the global agricultural research consortium; EMBRAPA, Brazil's agricultural research corporation; CAAS, the Chinese Academy of Agricultural Sciences; and Wageningen University and Research, the Netherlands. The principle affirmed in the report is that African centers of excellence belong in this column in their own right.

E.7 Frameworks, declarations and programs

SOFI (The State of Food Security and Nutrition in the World). Annual flagship report co-published by FAO, IFAD, UNICEF, WFP and WHO. SOFI 2025, launched in Addis Ababa in July 2025 with 2024 data, supplies the hunger figures in this report.
CAADP (Comprehensive Africa Agriculture Development Programme). The African Union's agricultural framework. The Maputo commitments of 2003 and their Malabo renewal of 2014 were succeeded by the Kampala Declaration of January 2025 and its Strategy and Action Plan for 2026 to 2035.
Kampala CAADP Declaration. Adopted January 2025. Commits African states to raise agrifood output by 45 percent, triple intra-African agrifood trade, lift locally processed food to 35 percent of agrifood GDP, and mobilize 100 billion dollars by 2035.
Nouakchott Declaration on Pastoralism. Adopted 29 October 2013 by six Sahelian heads of state, Senegal among them, committing to secure pastoral livelihoods, with the World Bank as a principal partner. Renewed and widened to fifteen countries at the Nouakchott +10 Forum of November 2024, now including Ghana and Côte d'Ivoire.

PRAPS (Regional Sahel Pastoralism Support Project). The World Bank program that operationalized the Nouakchott Declaration. An initial 248 million dollars, coordinated by CILSS, later renewed and extended.
CILSS. The Permanent Interstate Committee for Drought Control in the Sahel, the regional body that coordinates PRAPS.
AfCFTA (African Continental Free Trade Area). The continental free-trade area. Its trade rules and compliance requirements feature in the logistics node and in the planned food-law module.
Marrakech Declaration and New York Declaration. The informal call for convergence issued at the Marrakech roundtable of 3 June 2025, and its formal successor circulated for endorsement after the New York working session of 11 June 2026.

E.8 Technical terms and acronyms

Living lab. A structured, real-world environment for experimentation, data generation and iterative learning under real conditions. In the Food for Humanity design, the knowledge-generating end of the continuum.
Extension. Advisory services that carry agronomic and market knowledge to farmers. The report treats the extension worker as the end of every knowledge chain and the test of any research system.
Pastoral and agropastoral systems. Mobility-based livestock systems, and mixed crop and livestock systems, central to food security, land use and stability in the Sahel.
TVET. Technical and vocational education and training. The skills tier AgriConnect country compacts commit to overhaul.
Node. A stage of the agrifood value chain (production, processing, logistics, digital, finance, green economy). Masters360 plans training pathways node by node, co-designed with industry.

Final_Report on the NYC Working Session_12 July 2026 (edited)

Rapport d'audit final 2026-07-13

Créé le :	2026-07-13
De :	Andrea Lundh (andrea@andrealundh.com)
État :	Signé
ID de transaction :	CBJCHBCAABAAxBdui5iKjouZnBtca44HMnrqWtGN4ltP

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