Technical Report of Informal Consultations with Indonesian Agencies of the Ministry of Health on

Key elements of sustainability for local production of influenza vaccines

Consultation held in

Indonesia 12th – 13th March 2014
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1. Objective of the consultation

The World Health Organization, through its Country Office, organized an informal consultation with various agencies of the Ministry of Health of Indonesia to discuss elements of sustainability of influenza vaccine manufacturing in the country. The consultation had the following objectives:

- **Present the current work to develop a self-assessment checklist for sustainability of influenza vaccine manufacturing in developing countries.**
- **Obtain feedback from stakeholders in Indonesia regarding the suitability of the checklist.**
- **Emphasize relations between WHO and Indonesia on a shared project regarding the establishment of influenza vaccine manufacturing to support pandemic preparedness (WHO grant to Bio Farma).**

The consultation took place in Jakarta and Bandung and the WHO team met with the following institutions and organizations:

- Direct Transmitted Diseases Control (DTDC) MoH RI, sub directorate Acute Respiratory Infection (ARI), and sub directorate Surveillance and Immunization, Directorate Surveillance, Immunization and Quarantine MoH
- National Agency of Drug and Food Control (NADFC)
- Centre of Biomedical and Basic Health Technology (National Institute for Health R&D), Ministry of Health
- Centre for Health Promotion
- Bio Farma
- Indonesia Technical Advisory Group on immunization (ITAGI).

A list of agencies involved in these meetings is included in annex 1.

2. Objective of the report

This report aims to provide the Government of Indonesia and the Ministry of Health with a summary of the discussions held during the consultation and with high-level considerations regarding possible actions to improve the sustainability of influenza vaccine manufacturing. The suggested next steps are drawn from the outcomes of the discussions during the meetings in Jakarta and Bandung with the aim of outlining the elements of a coherent policy strategy that would increase sustainability of the local influenza vaccine manufacturing.

WHO remains available for technical support in the implementation of the suggested next steps.

3. Background

The World Health Organization’s Global Action Plan for Influenza Vaccines (GAP) was initiated in 2006 to address challenges of timely and equitable access for all populations to pandemic vaccines in the event of influenza pandemic. GAP proposes to respond to these challenges through three critical avenues:

- The increase of evidence-based seasonal influenza vaccine use.
- The increase of global influenza vaccine production capacity and strengthening of corresponding national regulatory competency.
• The development of new influenza vaccines that are higher-yielding, faster to produce, broader in protection, and with a longer duration.

WHO, through its Technology Transfer Initiative, directly supports 14 developing countries to establish or expand influenza vaccine manufacturing, including Bio Farma in Indonesia. The sustainability of the newly established production capacity is essential to ensure that the GAP goals are reached and maintained. A stable and reliable seasonal influenza vaccine manufacturing is considered determinant for pandemic preparedness. WHO is therefore addressing identified technological, policy, financial, and logistical issues that affect sustainability of influenza vaccine manufacture in developing countries (1).

The complexities and challenges of the multi-sectorial nature of influenza vaccine manufacturing can be disentangled through a high-level check-list that aims at helping policy-makers and manufacturers to discuss and explore key elements that comprise a system for sustainable influenza vaccine production. The check-list addresses the following areas:

• Policy environment and healthcare system
• Surveillance system and influenza specific evidence
• Product development and manufacturing
• Product approval and regulations
• Communication to support influenza vaccination

The checklist aims to offer a systematic way to analyze the specific economic, political and industrial context in which production occurs, providing a support to the government for the identification of the right business model made of a successful mix of policies and actions to achieve sustainability.

The Technology Transfer Initiative exists as part of a larger WHO mandate born within the mandate and scope of the Global Strategy and Plan of Action on Public Health, Innovation and Intellectual Property (GSPA-PHI) (2), approved in 2008 by Member states, that encourages an holistic approach to increase innovation for and access to medical products and technologies for diseases disproportionally affecting developing countries.

Within the GSPA-PHI, a prominent role is occupied by transfer of technology as a means to promoting local production in developing countries and improving access to medicines, vaccines and diagnostics. The report Local Production for Access to Medical Products (3), developed under the scope of the GSPA-PHI, defines transfer of technology “as the transfer of technical information, tacit know-how and performance skills, technical materials or equipment, jointly or as individual elements, with the intent of enabling the technological or manufacturing capacity of the recipients... in a mutually beneficial manner, while promoting public health objectives.”

The framework proposed in the above-mentioned report provides a framework for Member States to use the “sustainability check-list,” as it describes the importance of policy coherence (especially within industrial and health policy) in local production and the necessity of such coherence in accomplishing public health objectives.

The Government of Indonesia had already committed itself to local production of many pharmaceutical and biological products. In particular, Bio Farma is the government-owned manufacturer, established in 1890, providing of all traditional EPI vaccines for the national immunization programme. Bio Farma received a grant from WHO to complement its efforts in establishing influenza vaccine manufacturing with a technology transfer agreement with Biken (Japan).
Various studies (4) have demonstrated that coordination of industrial and health policies with the goal of encouraging local production can lead to improvements in access to medical products, given certain conditions, such as a coherent policy environment, reliable government procurement, product quality assurance, and market certainty.

When established, local production has a large number of potential benefits:

- It can result in potential cost savings due to less expensive, locally produced medical products, if the production scale is sufficiently big.
- The supply of medical products can also be more reliable.
- The products can be of higher quality than certain imports, due to suitability to local culture and conditions.
- It can stimulate local increased innovation capacity and greater development of human capital.
- Some manufactures are able to develop export capacity for their products, improving the national balance of payments.
- Finally, there is potential for employment generation and spill-over effects in other sectors of the economy (6).

However, in order to achieve these benefits, countries must have policy coherence in regards to local production, ensuring a policy environment that secures increasing financial returns to local enterprises over time. There are strong economic and political drivers to establish and enhance national capacity to manufacture medical products, in addition to the public health objectives, and countries should be aware of these drivers and purposefully work to maintain the sustainability of local production to accomplish public health objectives.

In the particular case of influenza vaccines, a report from the Centre for Global Health Policy at the University of Sussex (5) encouraged the development of sustainable business models for medicines, vaccines, and diagnostics. The report encouraged the promotion of “enhanced regulatory certainty, particularly for manufacturers... of pandemic influenza vaccines,” “strengthening intergovernmental collaboration through global joint programming and greater harmonization of policy priorities, markets and regulation,” and “greater efforts to combine emergency and commercial use applications of products.” Market certainty and reliable government procurement strategies are two important incentives for engaging industry with partnerships for health security.

Local production contributes to health security by maintaining an uninterrupted supply of essential medical products: the long lead times for offshore producers of medical products can cause interruptions in supply. Furthermore, local producers with their potentially more efficient local supply chains can prevent greater disruptions in rural and poor areas.

4. Summary of the discussions

The discussions during the consultation were organized around the areas covered by the checklist.

The checklist considers the policy environment and healthcare system. Specific public health priorities that are formalized into coherent national policies should be based on evidence of the burden of diseases and recommendations from expert bodies (national and international advisory groups) and should be built on the capacities of the healthcare infrastructure. However, the public health policies should be in line with national development, industrial, procurement, fiscal and economic policies, ensuring that each sector contributes to the well-being and security of the
populations and that legislative, structural and barriers linked to other capacities are addressed and removed.

The checklist points to the fundamental role played by two components of critical national infrastructure in ensuring sustainability of vaccine manufacturing:

- The surveillance system as the foundation for the development of evidence-based public health policies and an essential investment for a reliable, accurate and timely information system.
- The national regulatory authority, for the assessment, licensure, control, and surveillance of biological medical products.

These two areas should benefit from a continuous exchange of information on regulations, methodologies, procedures, mechanisms and expertise with international partners, expanding the reference geographical scope to ensure harmonization and maximization of synergies.

The checklist dives also into the need for a solid and high quality product development and manufacturing, recognizing that sustainability is ensured if the business plan is comprehensive and solid, international manufacturing standards are abided to and quality improvement becomes an objective for the manufacturer.

The last area addressed by the checklist is communication as, firstly, a fundamental enabling function that affects the way the other components effectively perform and, secondly, as a technical area of the health system as a means to create an environment where the public health policies and programmes are understood and accepted by the populations. Governments should ensure that views, concerns, information needs and motivation of relevant stakeholders, including beneficiaries, are factored into every step of the programme scoping, design, implementation, monitoring and evaluation. This will improve stakeholder engagement and ownership, which in turn will contribute to the success of healthcare programmes and the achievement of public health goals.

A summary of the discussions during the consultation is provided below.

4.1 Influenza vaccination as part of pandemic preparedness and SARI surveillance

The team met with senior staff at the Direct Transmitted Disease Control Department (DTDC) and Department Surveillance, Immunization and Health Quarantine, Directorate General Diseases Control and Environmental Health MoH RI to discuss the surveillance system and pandemic response system. The importance of policy coherence for insuring sustainable production was discussed as was the significance of universal health coverage and universal access to medical products for supporting vaccination and sustainable manufacturing capacity.

4.1.1 Overview of the H1N1 2009 Pandemic

During his presentation, “Lessons Learnt in the Pandemic Response and Updating the National Influenza Pandemic Preparedness Plans (NIPPP) & Influenza Surveillance,” the Director of DTDC provided details about the 2009 H1N1 Pandemic in Indonesia (7). There were 1,097 confirmed H1N1 cases with ten deaths in 2009 (as reported to Ministry of Health RI). 76% of provinces (25 of 33) had confirmed cases, and 18% of districts (89 of 495) had cases confirmed by the MoH.

4.1.2 Capacity

The National Influenza Pandemic Preparedness Plan (NIPPP) contains several country specific measures including (7):
• Prevention and management at ports of entry
• Epidemiological and virology surveillance
• Availability and mobilization of pharmaceutical, personal protective equipment and other supplies
• Referral hospitals for patients with suspected and confirmed cases
• Laboratories with PCR testing capability for influenza A
• Implementation of the International Health Regulations
• Research related to ecology, transmission, clinical spectrum, and molecular genetics and antigenic shift
• Coordination with all stakeholders
• Simulation
• International collaboration
• Command and coordination
• Risk communication strategies (8).

Currently, 100 referral hospitals provide care free of charge for patients with suspected and confirmed cases. 44 laboratories have PCR testing capability for influenza A (9). Two are national referral laboratories, located in Jakarta (Biosafety Level 3), eight are regional laboratories, and 34 are sub-regional labs. PCR is the first-choice laboratory test for detecting the genetic material of influenza viruses (10).

The MoH is using a step-wise approach to seasonal influenza vaccination targeting the most at-risk groups including Hajj pilgrims, healthcare workers and the elderly. The WHO Strategic Advisory Group of Experts on Immunization (SAGE) recommends pregnant women as the most important risk group for seasonal influenza vaccination, followed by (in no particular order) healthcare workers, children (six to 59 months of age), the elderly, and those with high-risk conditions (11). Currently, Indonesia does not have a seasonal influenza vaccination policy in place, and its work on influenza focuses mainly on pandemic preparedness and H1N1.

4.1.3 Improvements since 2009

From the experience with the 2009 H1N1 pandemic influenza, Indonesia was able to draw some lessons and advance in improving the system, including the following (7):

• Finalization in 2010 of the vaccine deployment plan, that is ready for implementation,
• Availability of infrastructure for routine vaccine deployment in a pandemic scenario,
• Strengthened routine surveillance for ILI, SARI, and pneumonia, including at ports of entry, border crossings, and sentinel sites,
• Intensified Rapid Response Teams,
• Greater availability of pharmaceuticals and personal protective equipment,
• Manageability of expected high private sector demand on resources,
• Specific plan for containment in several boarding schools,
• Intensified risk communication by the Centre for Health Promotion,
• Immediate notification to provinces and districts of the results of laboratory tests.

The main aspects highlighted during the discussion following the presentations were:
The need to link seasonal influenza vaccination and pandemic preparedness into a coherent policy for local production and national security,
The need to strengthen the surveillance system, activating the necessary sentinel sites for regular reporting on ILI-SARI cases,
The need to develop a comprehensive approach to communication for influenza vaccination, creating trust among the population and the healthcare workers on influenza immunization,
The need to link various public health policies (i.e. NCDs, UHC, ageing population, etc.) to seasonal influenza prevention and pandemic preparedness to create synergies among vertical programmes and health system approaches.

4.3 Regulatory Environment
Regulatory certainty as a means to sustainability (summary rep from roundtable “pharmaceutical and security”)

WHO staff met with a team from the National Agency of Drug and Food Control (NADFC) and the head of the Safety Injection Surveillance Unit to discuss vaccine risk analysis and the regulatory approval process. During the discussions, the following information was provided:

- NADFC was recognized as fully functional against the WHO indicators in 2012,
- WHO has prequalified vaccines manufactured by Bio Farma (but not the currently approved seasonal influenza vaccine)
- Indonesia participates in ASEAN harmonization Initiatives related to regulation of vaccines,
- NADFC is not currently a participant in pandemic preparedness scenario exercises,
- Staff requested more training on risk assessment, GMP inspections, and other vaccine specific training within WHO Global Learning Opportunities for Vaccine Quality and recognized the value of the training already received.

The main aspects highlighted during the discussion following the presentations were:

- The need for more individual training on specific skills for regulators
- The need to create a stable, effective and productive working relation among the various departments of the MoH and the NADFC that contribute to pharmaceutical product regulation and use and that define the pandemic preparedness plan for the country
- The need to establish relations based on trust and mutual respect with national regulatory agencies of other countries in the region.

4.4 Surveillance
The Director of the Centre of Biomedical and Basic Health Technology (which is located within the National Institute for Health Research and Development – NIHRD- of the MoH) discussed influenza-specific evidence and influenza virological surveillance for ILI and SARI. The Director addressed the following points:

- Maintaining the influenza surveillance network poses challenges mainly related to the fragmentation of authority over laboratories, some of which are located within the Ministry of Education while others are supervised by district governments,
• The cost of the reagents and the adequacy of the equipment poses a problem for laboratory confirmation of suspected influenza cases,
• The NIHRD is a part of a consortium that includes the National Research and Technology Agency, MoH, Bio Farma, the University of Indonesia, and the Eijkman Institute. This consortium aims to improve research around influenza vaccines and enable Bio Farma to produce cell-based influenza vaccines by 2017,
• The process of evidence-based policy includes the agencies working on virological and epidemiological influenza surveillance, the data collected are channelled to and analysed in the Indonesian CDC from where information is shared for policies recommendations.

The main aspects highlighted during the discussion following the presentations, were:
• The need to advocate for the strengthening and funding of the surveillance system for ILI and SARI,
• The need for a stronger governance of the surveillance sector, removing fragmentation among different agencies.

4.5 Communication
WHO staff also met with the head of the Centre for Health Promotion to discuss communication related to influenza vaccination. The discussion touched upon the following points:

• On-going collaborations with health programmes in the development of communication strategies and campaigns to ensure that best practices are implemented also at province and district levels,
• The work of the Centre for Public Communication with media organizations, coordinating operations in risk communication during pandemics,
• The content and audience of an upcoming training for national communication experts and influenza or EPI managers focused on strengthening the communication system to support influenza vaccination hosted by WHO HQ and the Regional Office for South East Asia.

The main aspects highlighted during the discussion following the presentations, were:
The need to map the communication functions, infrastructure, policies and competencies with the aim of improving the effectiveness of the communication system and building trust among the populations for health programmes.

4.6 Manufacturing
The report from the Centre for Global Health Policy at the University of Sussex (5) specifically mentions influenza vaccine production and the promising ability of seasonal vaccine production capacity to lead to pandemic influenza vaccine production. The report describes the continuing challenges for seasonal production that they describe as a lack of access to technology and demand for seasonal vaccines. Representatives of Bio Farma presented information (12) about their own process and challenges with influenza vaccine manufacturing:

• The completed transfer of technology from the Japanese vaccine manufacturer Biken to Bio Farma for the full production process for influenza vaccine (Bio Farma currently does fill-finish of bulk from Biken, the commercial product – Flubio – was approved in 2009, and not available for export),
• The current annual production ranges from 150,000 to 250,000 doses of seasonal influenza vaccine, sold on the private market mainly for Hajj pilgrims,
• The recent suspension of the expansion of the facility to a potential capacity of 20 million doses annually and the strong support from the government to overcome the issues that lead to the current stop,
• The contribution of seasonal vaccine production to pandemic preparedness capacity, by maintaining needed skills and functionality of related technologies. Bio Farma could increase its production capacity for a new seasonal influenza vaccine to cover the annual needs of the 1 to 2 million Hajj pilgrims or to export the new vaccine especially targeting the larger pilgrim community and the employees of large companies,
• The current work in Bio Farma for the development of:
  o An H5N1 egg-based adjuvanted split vaccine expected to be ready by 2016,
  o A seasonal influenza egg-based split vaccine,
  o An H7N9 egg-based split vaccine, with production of experimental batches expected by early 2014,
  o A cell-based influenza vaccine (MDCK derived, split) expected to have a pilot for production scale in 2014,
• The current average price per dose of the seasonal vaccine in Indonesia that varies from 9 to 15 USD, considered too expensive for a certain part of the population and not competitive on the international market.

The main aspects highlighted during the discussion following the presentations were:
• The current size of the production scale is such that the price of the product remains high for the local market.
• The need for the government to recognize the link between seasonal influenza vaccine production capacity and pandemic influenza vaccine production capacity, therefore incentivizing the maintenance of the seasonal capacity.
• The need to explore export possibilities of a new seasonal influenza vaccine, to scale up the production and achieve economy of scale that allow a lower price of the final product.

4.7 The Indonesian Technical Advisory Group on Immunization
WHO staff also met with representatives of the Indonesian Technical Advisory Group on Immunization who presented the work of the group and commented on the following:

• Although data exist about the cost-effectiveness of influenza vaccination, there is no knowledge about the specific effectiveness of influenza vaccine on health care workers in public hospitals and influenza burden of disease in specific areas of Indonesia.
• In September 2014 the United States National Institute of Health will hold an influenza meeting in conjunction with an Indonesian-led initiative that could be used as a platform for advocacy around the definition of policies for influenza vaccination.

The main aspects highlighted during the discussion following the presentations were:
• The need to explore the availability of data on burden of influenza and cost effectiveness of vaccination, to initiate an analysis and arrive to recommendations regarding seasonal influenza vaccination.
5. Recommendations for strengthening influenza vaccine manufacturing sustainability in Indonesia

The results of the analysis of the discussions held during these consultations, the following steps would contribute to the creation of an environment that would increase the sustainability of influenza vaccine manufacturing in Indonesia, and its national pandemic preparedness.

- Analysis of each area: conduct an in-depth analysis of the environment in which influenza vaccine manufacturing takes place, using the check-list, to complement the information provided in this report. WHO can support the Government in this exercise.
- Define policy recommendations to strengthen sustainability: from the in-depth analysis and a sector-wide consultation with all relevant actors, the Government could draw conclusions on areas to be strengthened, coordinated and improved to create a more sustainable environment for influenza vaccine manufacturing and pandemic preparedness. WHO could facilitate this process.
- Identify areas for capacity building at individual level (skills, competencies, etc.): through the same process as identified above, the Government would be able to identify all the areas needing specific capacity building, from trainings to peer learning, to curricula development at academic level.
- Develop an agreed work-plan: the Government internal process should lead to the establishment of a clear roadmap for improvement of the sustainable environment for influenza vaccine manufacturing and implementable work-plans for the relevant agencies and organizations.
- In particular, from these very preliminary discussions, and a review of available literature and guidelines, the following areas warrant further analysis/discussion:
  - Create a mechanism to link public health policies to industrial, trade, development, fiscal and other relevant policies, ensuring priorities are agreed at government level and implementation is facilitated through this mechanism
  - Activate ITAGI to analyse the current data on burden of influenza in the country and commission a cost-benefit analysis of influenza vaccination to arrive to agreed recommendations
  - Promote and incorporate into public health policies the link between seasonal influenza vaccination and pandemic preparedness. With this in mind, analyze the potential inclusion of seasonal influenza vaccination among the health priorities, identifying the priority group for vaccination together with the ITAGI
  - Conduct an in-depth analysis of the national communication system, with a view at ensuring that views, concerns, information needs and motivation of relevant stakeholders, including beneficiaries, are factored into every step of the programme scoping, design, implementation, monitoring and evaluation
- Ensuring timely access to vaccines for those with potential exposure to influenza, especially in rural and poor areas.
- A reduction in the time from health service presentation to diagnosis, aiming at reducing the delay in antiviral drug initiation.
- Coordination at village level, providing links between the public health officials, the large commercial sector, and village-level authorities, especially for all relates to poultry production and disease reporting. Local health workers should also be well informed about influenza and
vaccination in order to appropriately respond in coordination with government officials to ensure effective surveillance and rapid, coherent response to potential outbreaks.
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Annex 1 – High-level check-list Key elements of sustainability for influenza vaccine manufacturing in low and middle income countries

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<th>Sustainability Element</th>
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<td>Policy environment and Health Care System (government representatives are expected to have the information required below)</td>
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<td>Political will for in-country influenza vaccine manufacture</td>
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<td>Political will for pandemic influenza preparedness</td>
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<td>International influenza recommendations to shape national policies</td>
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<td>Coherence among relevant national health policies and programs</td>
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<td>Seasonal Influenza vaccination and control policies are developed also as means to sustain pandemic preparedness and national security</td>
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<td>Target groups for seasonal influenza immunization have been established and are part of the immunization policy</td>
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<td>The price of the vaccine is not a barrier for the government to provide it for free to the target groups</td>
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<td>Vaccine delivery infrastructure is in place and maintained</td>
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<td>Efforts are made to overcome possible bureaucratic obstacles to establish vaccine manufacturing</td>
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National and regional procurement and distribution policies to promote in-country production and sourcing of materials

The vaccine distribution system is in place and efficient

There is availability of the vaccine at the hospital, healthcare centers and pharmacies level

Policies created to generate skilled local workforce for local vaccine production

Policies created to influence the development and size of the GMP bio-manufacturing environment

Target groups for pandemic influenza immunization have been established and are part of the pandemic preparedness plan

Understanding of how the multilateral and bilateral agreements affect commercialization and import and export of products

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**Influenza-Specific Evidence** (government representatives are expected to have the information required below)

- Surveillance system for virological surveillance in place (sentinel cites, technology and human resources)
- Accurate and timely surveillance reporting
- Design of data collection driven by surveillance objectives.
- Annual surveillance reports with risk factor data produced
- Data aggregated and reported on international data
### Sharing Platforms

- **The burden of influenza is known in the country**
- **Cost-effectiveness of seasonal influenza vaccine in target groups is known**
- **Data on impact of influenza is expressed in a way that resonates with priorities of policymakers**

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### Product Development and Manufacturing (this section is answered by local manufacturers)

- **Business plan based on analysis of production costs, price of product and return on investment**
- **Reliable and stable supply of utilities**
- **A proportion of the revenues is planned to be re-invested in R&D**
- **Reliable supply chain for all components**
- **Technologies selected based on cost-benefit analysis of initial investment, operating costs, time to market and product approval**
- **More than one product manufactured in the vaccine manufacturing facility**
- **Access to and retention of skilled workforce**
- **Complies with and is certified for Good Manufacturing Practice (GMP)**
- **In-house skills to design and administer clinical trials for vaccine product**
- **A system is in place at the manufacturing or governmental level to monitor adverse events after product commercialization**
- **Animal facility for the conduction of preclinical studies**
is available and under GLP
Partnerships with public or private entities to acquire know how and technology, conduct clinical trials, conduct post marketing surveillance, distribute the product, etc.
Participation in manufacturers’ networks or associations to do advocacy, exchange experiences, training etc.

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**Product Approval and Regulations** (this section is answered by representatives of the national regulatory authority)

National Regulatory Authority (NRA) “functional” in WHO – Pre-Qualification terms
Effective working relation between manufacturers and NRA
Manufacturer’s full awareness of regulatory requirements for the product in the country
Manufacturer’s full awareness of the requirements to submit a dossier for WHO Prequalification (PQ)
Regional regulatory approvals harmonized and integrated

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<td><strong>Communication for influenza vaccination</strong> (government representatives are expected to have the information required below)</td>
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<td><strong>key functions established and strong relationships among stakeholders with a public communication role</strong></td>
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<td>Well-trained and skilled communication staff</td>
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<td>Operational research and metrics for influenza communication outcomes</td>
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<td>Mechanisms for ongoing listening/feedback to update communication strategies and tactics</td>
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<td>Integrated communication strategy with other policies (with clear behavioral objectives for priority groups)</td>
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<td>Routine use of sound communication methodologies, tools and scientific expertise</td>
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<td>Regular evaluation of public campaigns and feedback to stakeholders</td>
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<td>There is awareness among the public and the healthcare workers of the benefits of seasonal influenza vaccination</td>
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Annex 2 – List of government agencies participating to the consultation on 12-13 March 2014

Subdit Acute Respiratory Infection (ARI), Direct Transmitted Diseases Control (DTDC), MoH RI
Subdit Surveillance, Directorate Surveillance, Immunization and Quarantine, MoH RI
Subdit Immunization, Directorate Surveillance, Immunization and Quarantine MoH RI
Unit Safety injection, Surveillance and risk analysis of therapeutic product, National Agency of Drug and Food Control (NADFC)
Center of Biomedical and Basic Health Technology, National Institute Health Research and Development (NIHRD)
Center for Health Promotion, MoH
Biofarma
Indonesia Technical Advisory Group for Immunization (ITAGI)