



Review of Science and Technology

Update from Scientific Advisory Board (SAB) and the Technical Secretariat of the OPCW



Dr Christopher Timperley
(Chairperson of the SAB)

Dr Jonathan Forman
(OPCW Science Policy Adviser)

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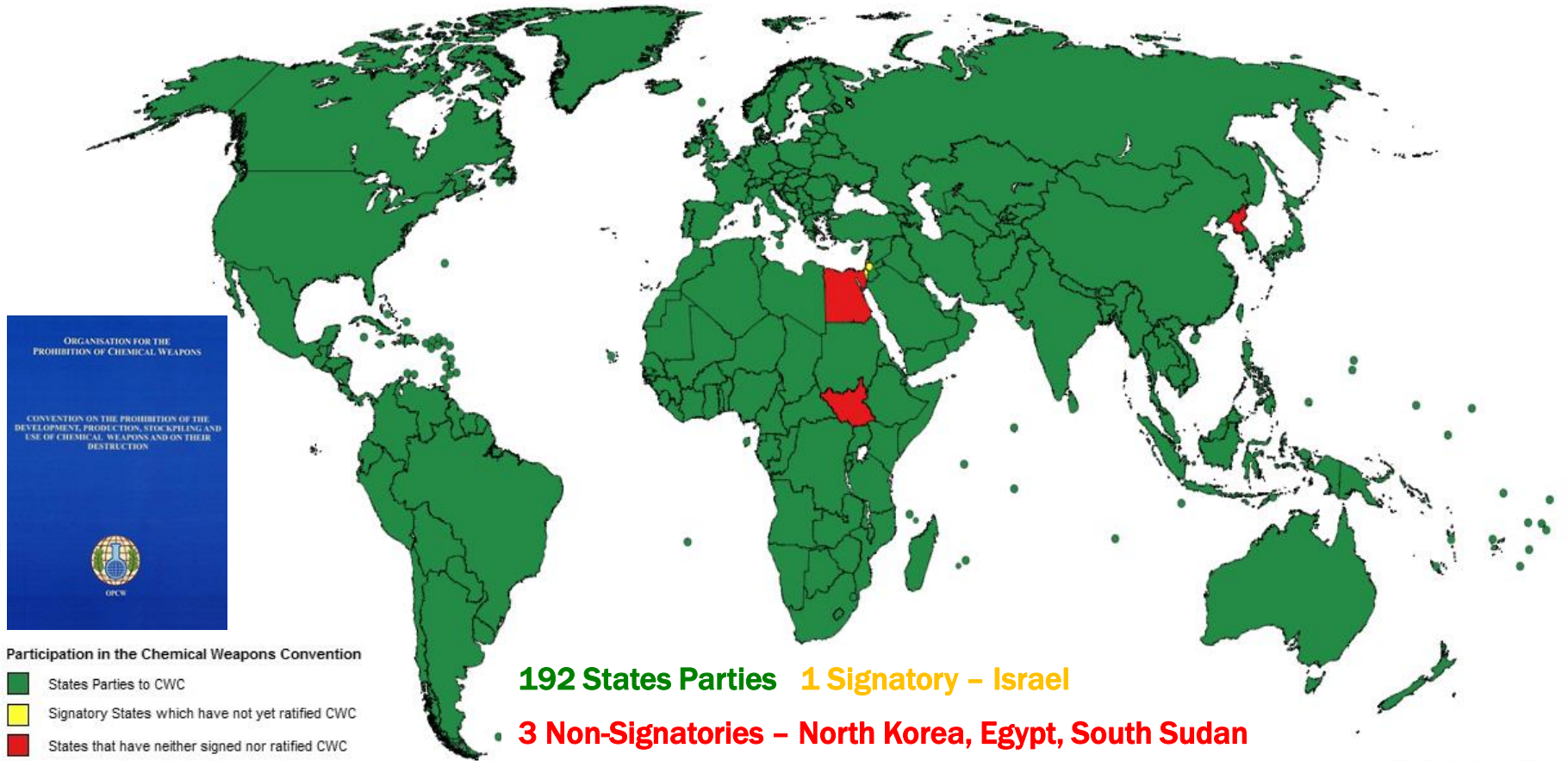
CWC and BWC threat spectrum

Classical CW	Industrial Chemicals	Bioregulators Peptides	Toxins	Genetically modified BW	Traditional BW
blister agents nerve agents toxic gases	Toxic industrial, pharmaceutical and agricultural chemicals CNS-active chemicals	substance P neurokinins	botulinum saxitoxin ricin	modified/tailored bacteria and viruses	bacteria viruses rikettsia anthrax plague tularemia
← Chemical agents →			← Agents of biological origin →		
← Poisons →		← Infectious Agents →			
← Chemical Weapons Convention (Article II) →				← Biological and Toxin Weapons Convention (Article I) →	

Adopted from Graham S Pearson, ASA Newsletter, 90-1, February 1990 and Robert Mathews at TWG on Convergence, 1st Meeting 2011.



The Chemical Weapons Convention



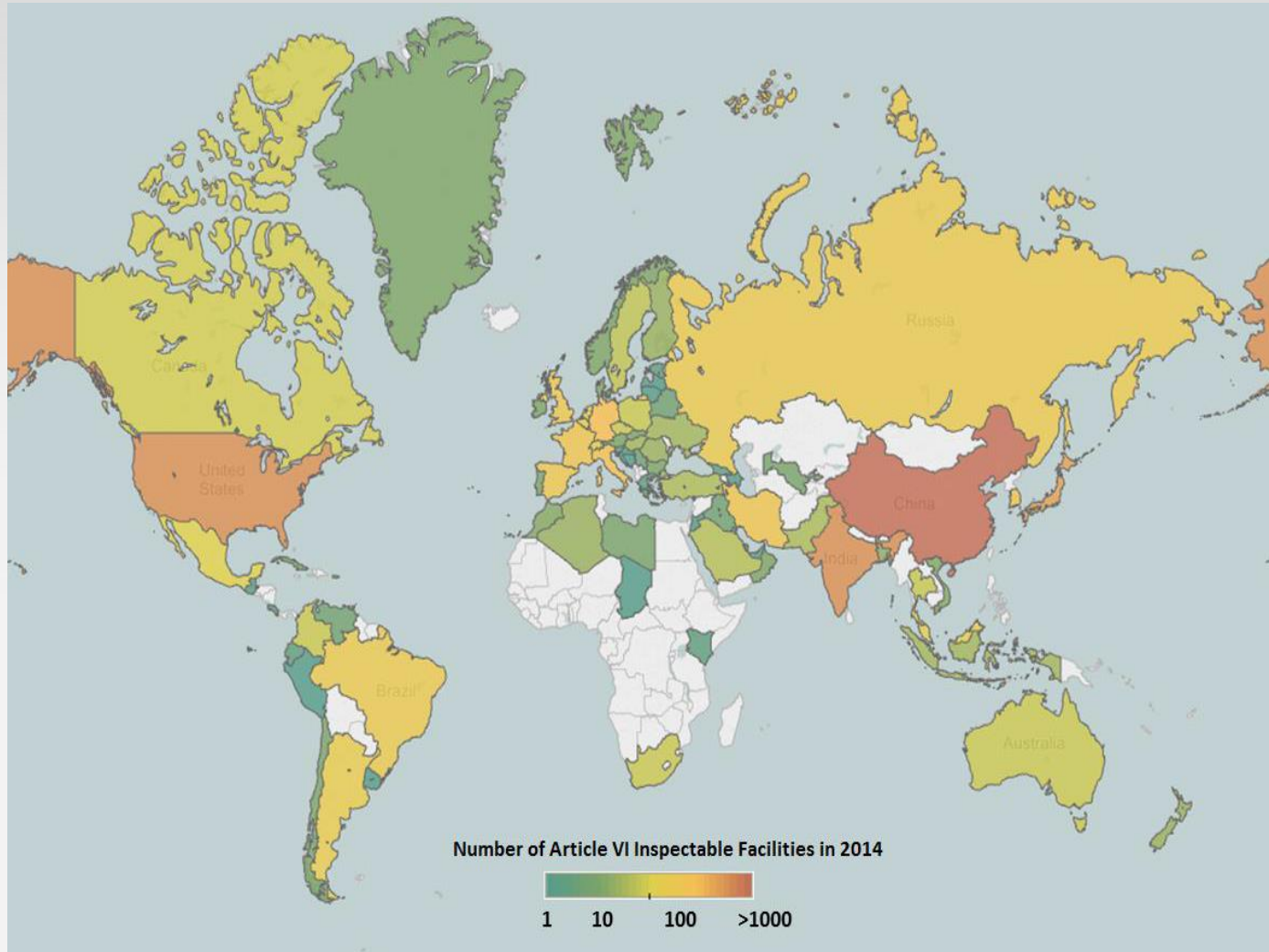


OPCW Scientific Advisory Board



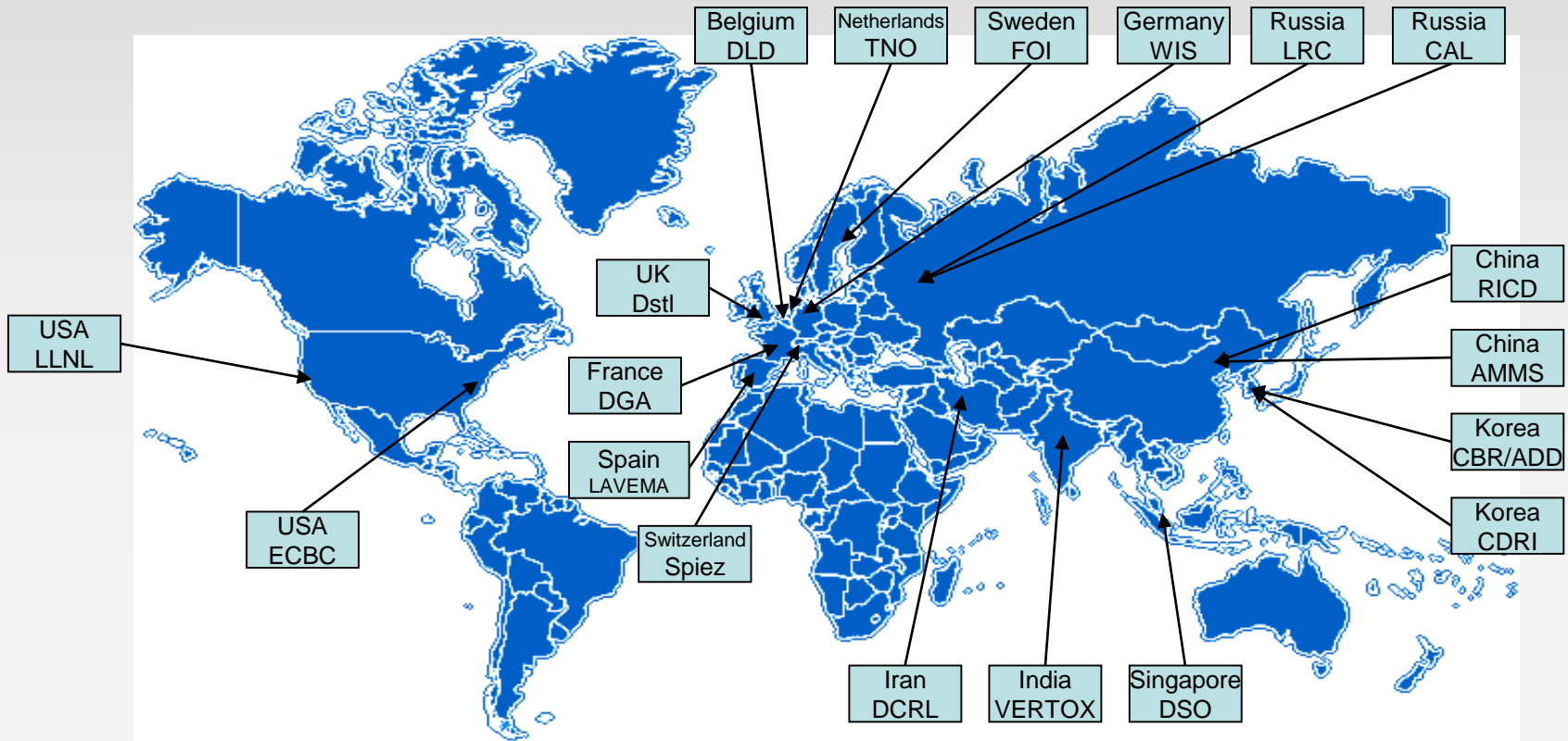


Inspection of chemical facilities



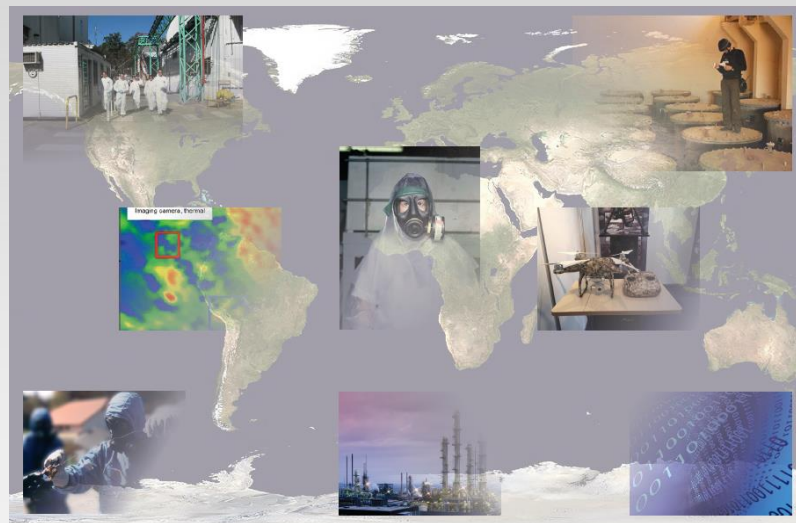


OPCW Designated Laboratories (environmental)



19 Designated Laboratories (5 suspended) in 15 countries

as of September 2015



VERIFICATION

REPORT OF THE SCIENTIFIC ADVISORY BOARD'S TEMPORARY WORKING GROUP

June 2015



ORGANISATION FOR THE PROHIBITION
OF CHEMICAL WEAPONS



Recommendation 1

The Secretariat should consider adopting a comprehensive, more analytical approach to verification utilising all available and verifiable information.



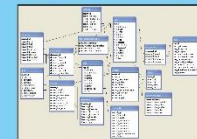
Recommendation 2

The Secretariat should acquire the capability to use open-source information on a routine basis.



Recommendation 3

The Secretariat should put in place an information management structure that can provide the support required for the verification process.



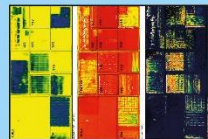
Recommendation 4

Remote/automated monitoring technologies should be added to the list of approved inspection equipment.



Recommendation 5

The Secretariat should look into the option of using satellite imagery for the planning of non-routine missions, in particular for IAU and CI.



Recommendation 6

The Secretariat should visit the National Authorities to obtain assurance on the accuracy and completeness of declarations. The outcome of such visits may impact on the inspection frequency.



Recommendation 7

The Secretariat must commission an independent review of all activities pertaining to the missions carried out in the Syrian Arab Republic.



Recommendation 8

The list of declarable OCFs submitted by States Parties should include all facilities which fall under the definition/requirement of paragraph 1 of Part IX of the Verification Annex, regardless of the purity level of a DOC or DOC mixtures produced.



Recommendation 9

Not all facilities that fall under Part IX of the Verification Annex should be considered of the same relevance to the object and purpose of the Convention. The TWG recommends a practical approach for enhancing the utilisation of verification resources for OCF declaration and on-site inspection processes.



Recommendation 10

The verification thresholds for OCFs producing highly relevant chemicals, and the possibility of revision of the product group codes, should be addressed by the SAB as well as the industry cluster.



Recommendation 11

The OPCW should increase the staff of the OPCW Laboratory to cope with various aspects of IAU, biomedical samples, trace environmental analysis, toxins, and on-site analysis. Establishing a network of DLs for biomedical sample analysis should be a high priority.



Recommendation 12

Lessons on chemical sampling and analysis from the OPCW's support to the 2013 United Nations Mission to Investigate the Use of Chemical Weapons in the Syrian Arab Republic, and all subsequent OPCW activities in relation to the Syrian Arab Republic must be identified and implemented.



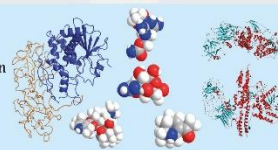
Recommendation 13

PTs should incorporate a broader range of chemicals, and at a wider range of concentrations, to prepare laboratories for IAU-type scenarios.



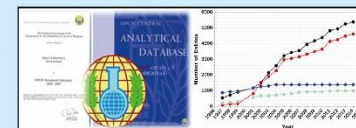
Recommendation 14

The Secretariat should expedite toxin identification exercises.



Recommendation 15

Continuous additions to the OPCW Central Analytical Database (OCAD) are recommended to allow the OPCW to meet all its mandated inspection aims, including IAU.



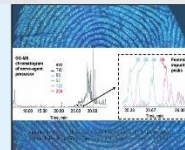
Recommendation 16

Developments in analytical instrument portability, miniaturisation and disposable biosensors should be periodically reviewed by the Secretariat and the SAB for potential applicability to on-site analysis.



Recommendation 17

The Secretariat should monitor developments in attribution analysis/chemical forensics.



Recommendation 18

The Secretariat should augment its capability to monitor and forecast developments in science and technology of relevance to the Convention and its verification regime.



<https://www.opcw.org/special-sections/science-technology/science-technology-essentials/>



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/opcwonline




/opcwonline



/company/opcw



Actions to take recommendations forward



OPCW

Executive Council

Eightieth Session
6 – 9 October 2015

EC-80/DG.7
28 August 2015
Original: ENGLISH

NOTE BY THE DIRECTOR-GENERAL

THE IMPACT OF DEVELOPMENTS IN SCIENCE AND TECHNOLOGY
IN THE CONTEXT OF THE CHEMICAL WEAPONS CONVENTION

Annex

**ACTION TO IMPLEMENT THE RECOMMENDATIONS MADE BY THE SCIENTIFIC ADVISORY BOARD
IN ITS REPORT ON VERIFICATION¹¹**

Recommendation from the SAB	Implementation	Expected outcomes/results
<p>Recommendation 1: The Secretariat should consider adopting a comprehensive, more analytical approach to verification utilising all available and verifiable information.</p>	<ul style="list-style-type: none"> • <u>Secretariat</u>: Strengthen the overall approach to verification. Explore different ways of working – based on past experiences, notably non-routine missions since 2013 as well as best practices from verification regimes of other organizations. Enhance cross-unit interaction by using project-based management coupled with clear accountabilities. Review the organisational structure to ensure it is fit for purpose in light of future verification needs. Simplify the internal-control regime. Augment the systematic information analysis – conceptual frameworks (including determination of the key information needed for effective verification and how to obtain it), staff posts, and information tools. Assess the degree of implementation of the CWC and determine how to address any gaps. Augment training in the relevant technologies/techniques/tools, e.g. data analysis and geographical mapping capabilities. • <u>Resource implications</u> (Medium-Term Plan and annual Programme and Budget): Staffing and investments in and maintenance of IT systems. 	<ul style="list-style-type: none"> • Reduced risk of re-emergence of chemical weapons through a comprehensive verification regime that is relevant to all future challenges. • Increased completeness of declarations. • Reduced declaration discrepancies.
<p>Recommendation 2: The Secretariat should acquire the capability to use open-source information on a routine basis.</p>	<ul style="list-style-type: none"> • Secretariat informal paper of 31 July 2012 refers. • <u>Secretariat</u> – current use of publicly available information includes: <ul style="list-style-type: none"> ○ Maintaining technical expertise of staff members for effective verification. ○ Assessing developments and trends in the chemical industry 	<ul style="list-style-type: none"> • Tailored assistance to current and emerging States Parties for full and effective implementation of Article VI. • Increased completeness of declarations.

¹¹

SAB/REP/1/15, dated June 2015, www.opcw.org/fileadmin/OPCW/SAB/en/Final_Report_of_SAB_TWG_on_Verification_-_as_presented_to_SAB.pdf



Procedures and laboratory capabilities

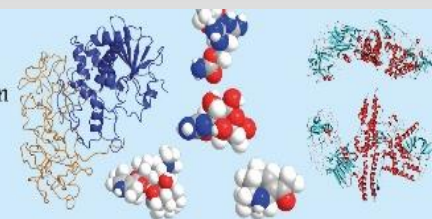
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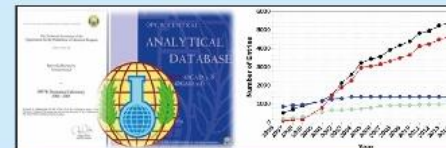
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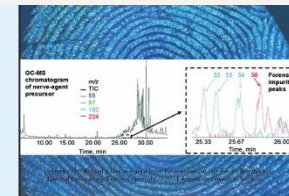
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Science For Diplomats at CSP-20

Chemical Forensics

Abundance

2e+07
1.5e+07
1e+07
0.5e+07
0

Wednesday 2 December 2015

9:00- 10:00

Antarctica Room

World Forum

Join us for Coffee and a Light Breakfast!

25.00 30.00 35.00 40.00 45.00 Time-->





ORGANISATION FOR THE
PROHIBITION OF CHEMICAL WEAPONS



United Nations
International Crime and Justice
Research Institute



The Hague Security Delta

Emerging Technologies and the CWC:

Autonomous Systems and Artificial Intelligence

20th Session of the Conference of States
Parties to the Chemical Weapons
Convention

Monday 30 November 2015
13:00-14:45
Europe Room
World Forum
The Hague

Join us for
a drone demonstration
and lunch!





Recommendations related to Article VI

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The list of declarable OCPFs submitted by States Parties should include all facilities which fall under the definition/requirement of paragraph 1 of Part IX of the Verification Annex, regardless of the purity level of a DOC or DOC mixtures produced.



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Recommendation 10

The verification thresholds for OCPFs producing highly relevant chemicals, and the possibility of revision of the product group codes, should be addressed by the SAB as well as the industry cluster.



Discussions initiated in the Industry Cluster



Recommendations 9-10 follow from TWG on Convergence

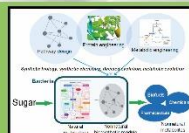
Recommendation 1

The SAB, or a suitable TWG, and the TS should continue to monitor advances in production facilities and technologies, and related trends such as outsourcing and modularisation of equipment. Assessments should be made on a periodic basis to determine their relevance to verification under the CWC. Regular engagement with subject matter experts, e.g. from the biotechnology industry, will be required.



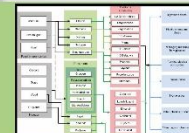
Recommendation 2

The SAB should monitor developments in biological and biologically-mediated chemical production processes, such as metabolic engineering, synthetic biology and associated enabling technologies. Regular engagement with subject matter experts will be required.



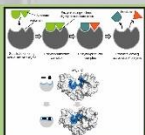
Recommendation 3

The SAB should continue to monitor the range of chemicals being studied and produced using biological or biologically-mediated processes.



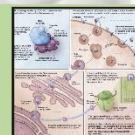
Recommendation 4

The SAB, or a suitable TWG, should review advances in rational enzyme design prior to the next review conference.



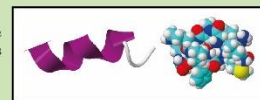
Recommendation 5

The SAB, or a suitable TWG, should review the feasibility of using metabolic engineering or synthetic biology to obtain toxins prior to the next review conference.



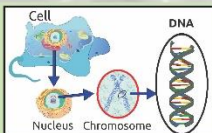
Recommendation 6

The TS should increase and maintain in-house knowledge of bioregulators, and possible applications of new developments in drug delivery.



Recommendation 7

The SAB, or a suitable TWG, should review the synthesis of replicating organisms prior to the next review conference.



Recommendation 8

The SAB, or a suitable TWG, should review progress in the use of enzymes for decontamination prior to the next review conference.



Recommendation 9

The OPCW should monitor advances in protective equipment and possible applications for OPCW personnel as they become commercially available.



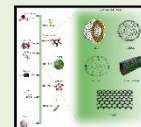
Recommendation 10

The OPCW should consider possible applications of diagnostic devices to on-site activities as they become commercially available.



Recommendation 11

The SAB should monitor advances in nanotechnology prior to the next review conference. Regular engagement with subject matter experts will be required.



Recommendation 12

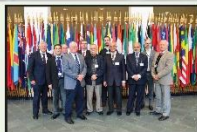
The SAB and TS should examine ways to increase and maintain in-house, high level knowledge of a broader range of scientific disciplines.



<https://www.opcw.org/portal/sections/science-technology/science-technology-monitor/>

Recommendation 13

A venue like the TWG on convergence of chemistry and biology should continue to exist, possibly as a temporary working group or a standing arrangement under the SAB.



Recommendation 14

National Authorities could be encouraged to engage more actively on convergence issues, including interacting with relevant biological and chemical scientific communities and hosting relevant events. A standing item on science and technology at National Authority Days might provide an opportunity to promote and report back on such an activity. Adopting convergence as a major theme for a future National Authority Day would help draw attention to this issue.



Recommendations 15 & 16

The SAB and TS should continue to work across areas of overlap between the CWC and the BWC. The Director-General might ask States to consider knowledge of the biological sciences when considering nominating experts to the SAB.



The TS, supported by the SAB, should continue to participate in such meetings and continue to address convergence.

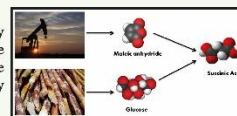
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The Director-General might consider meeting with the Chair of the BWC and heads of relevant international scientific bodies to explore issues around convergence.



Recommendation 18

Taking into consideration the convergence of chemistry and biology as it relates to the synthesis of chemicals, the TWG was of the view that any process designed for the formation of a chemical substance should be covered by the term "produced by synthesis".



Recommendation 19

The TS should review the technical feasibility of converting a bio-based chemical processing facility to produce chemicals of concern to the CWC.





Recommendations 9-10 follow from TWG on Convergence

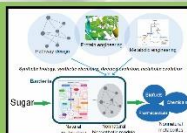
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Recommendation 2

The SAB should monitor developments in biological and biologically-mediated chemical production processes, such as metabolic engineering, synthetic biology and associated enabling technologies. Regular engagement with subject matter experts will be required.



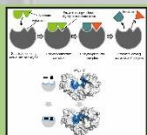
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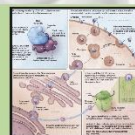
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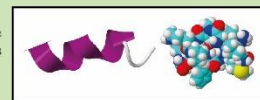
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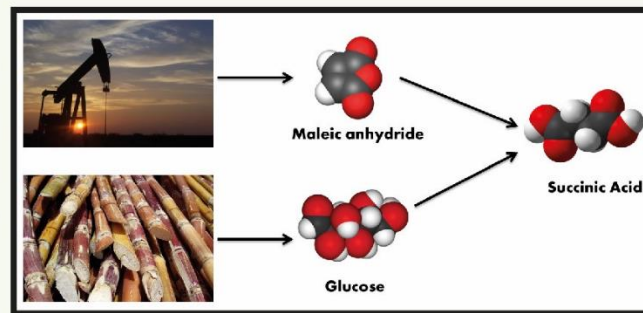


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Recommendation 17

The OPCW diagnostic and commercial activities should be reviewed and updated as necessary.



opportunity to promote and report back on such an activity. Adopting convergence as a major theme for a future National Authority Day would help draw attention to this issue.



The TS, supported by the SAB, should continue to participate in such meetings and continue to address convergence.



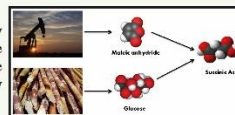
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@opcw @opcw_st



/opcwonline



/opcwonline



/company/opcw



/opcw

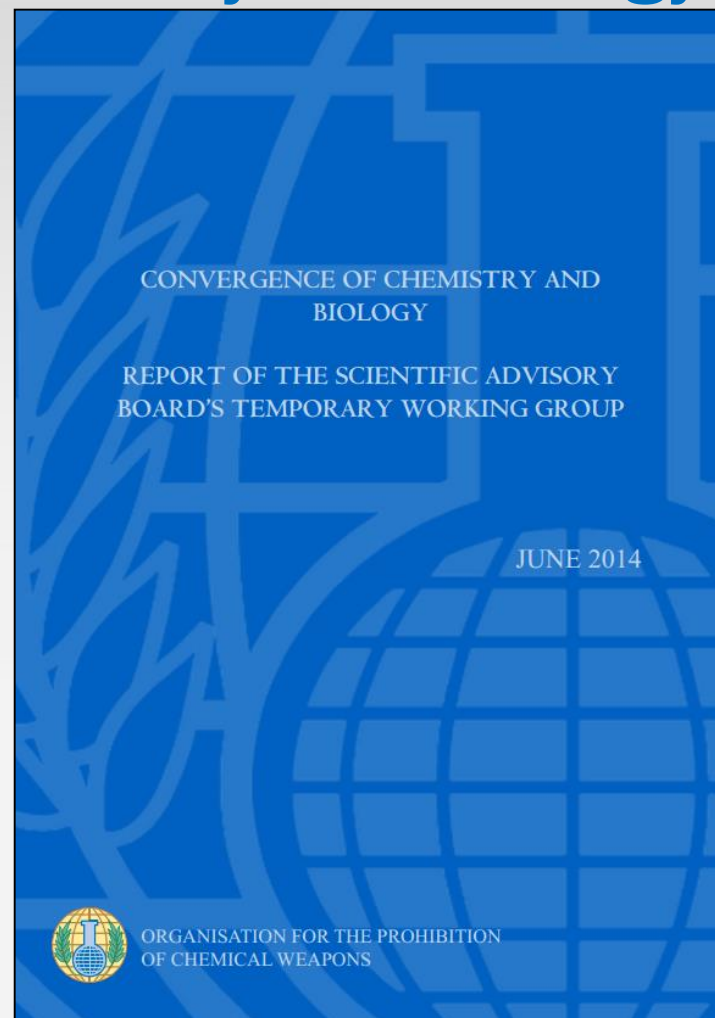
Report available at: https://www.opcw.org/fileadmin/OPCW/SAB/en/TWG_Scientific_Advisory_Group_Final_Report.pdf



ORGANISATION FOR THE
PROHIBITION OF CHEMICAL WEAPONS

Working together for a world free of chemical weapons

TWG on Convergence of Chemistry and Biology

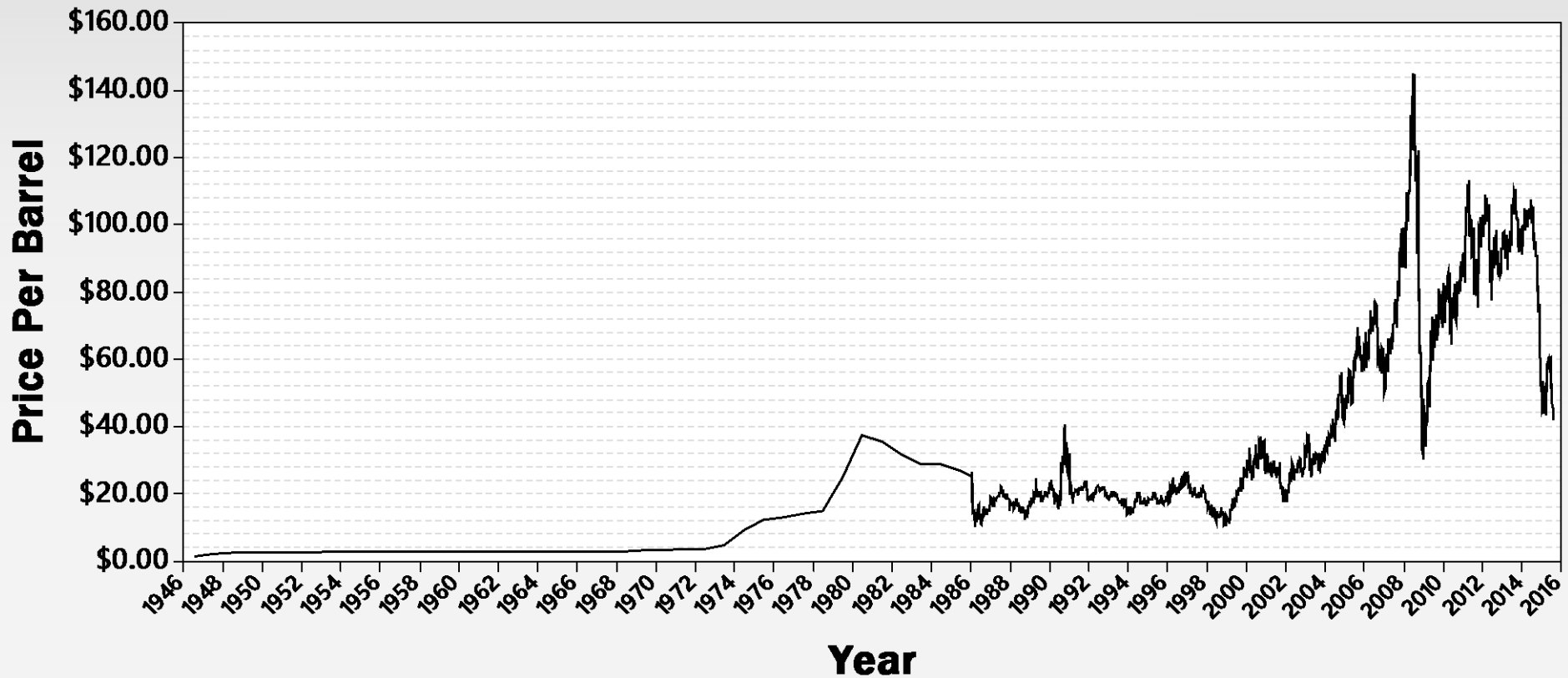


https://www.opcw.org/fileadmin/OPCW/SAB/en/TWG_Scientific_Advisory_Group_Final_Report.pdf



Oil economics and chemical production

(crude oil price/barrel 1946 – 17 August 2015)

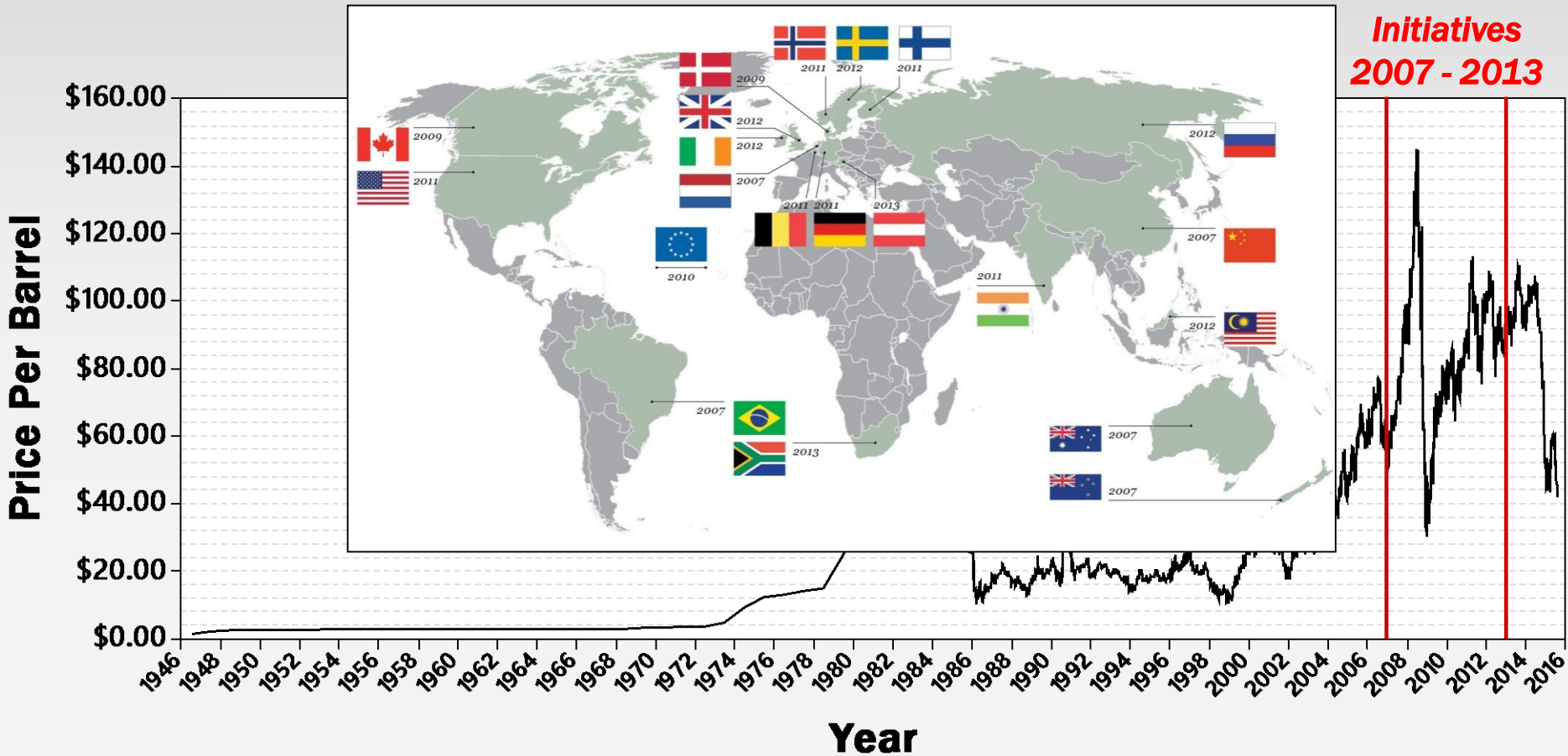




Oil economics and chemical production

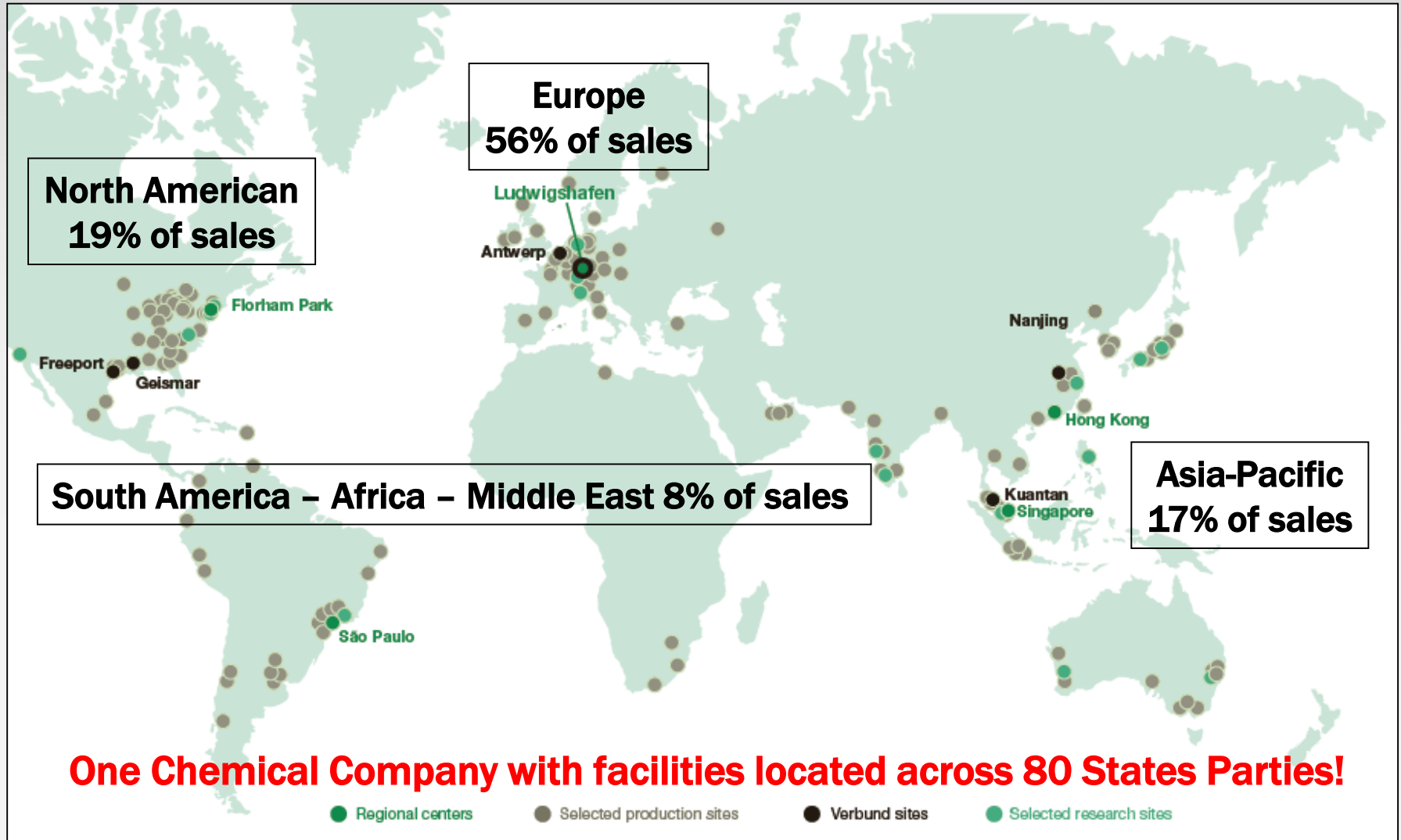
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**Bioeconomic
Initiatives
2007 - 2013**





Regional incentives with global reach

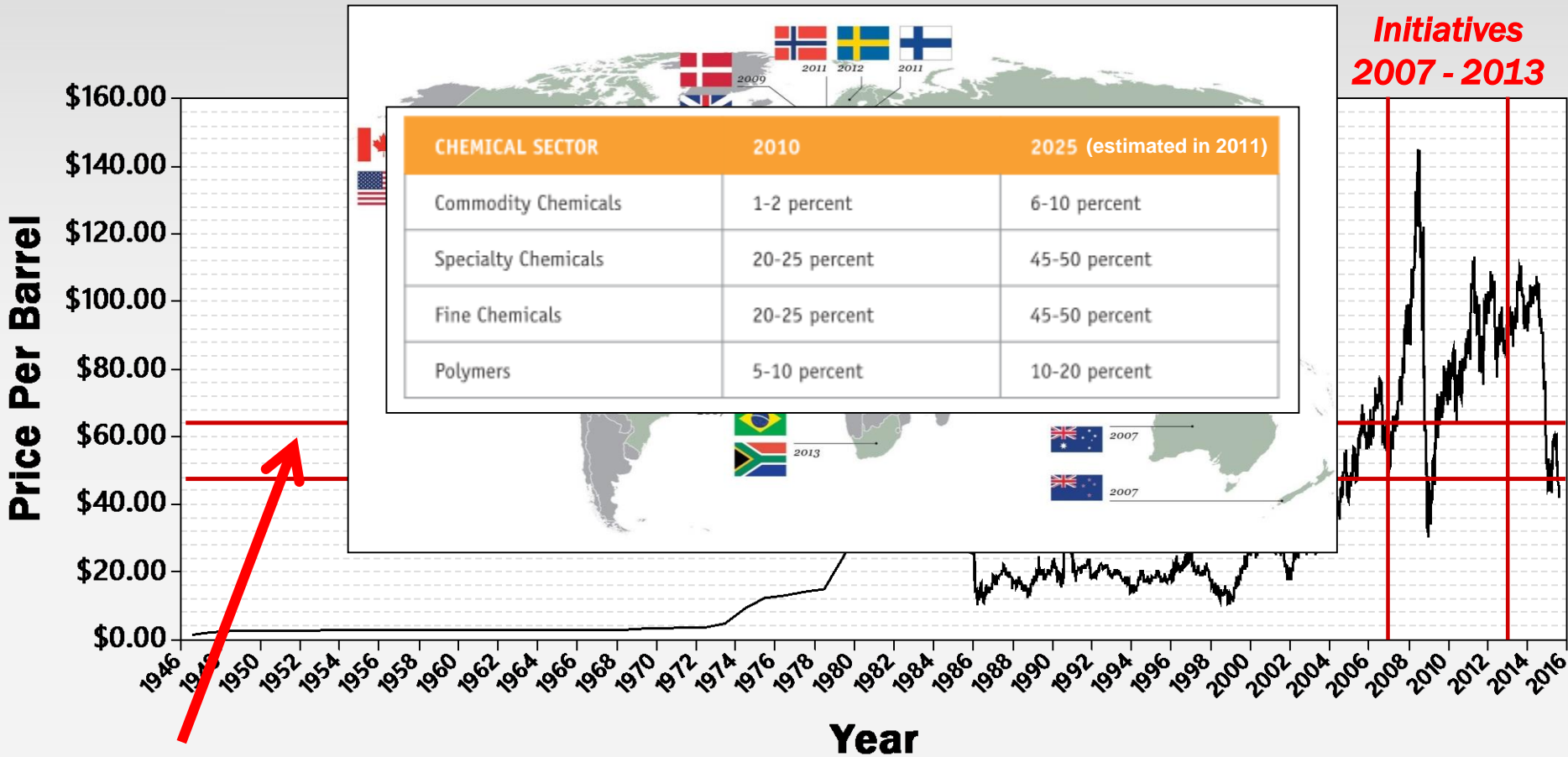




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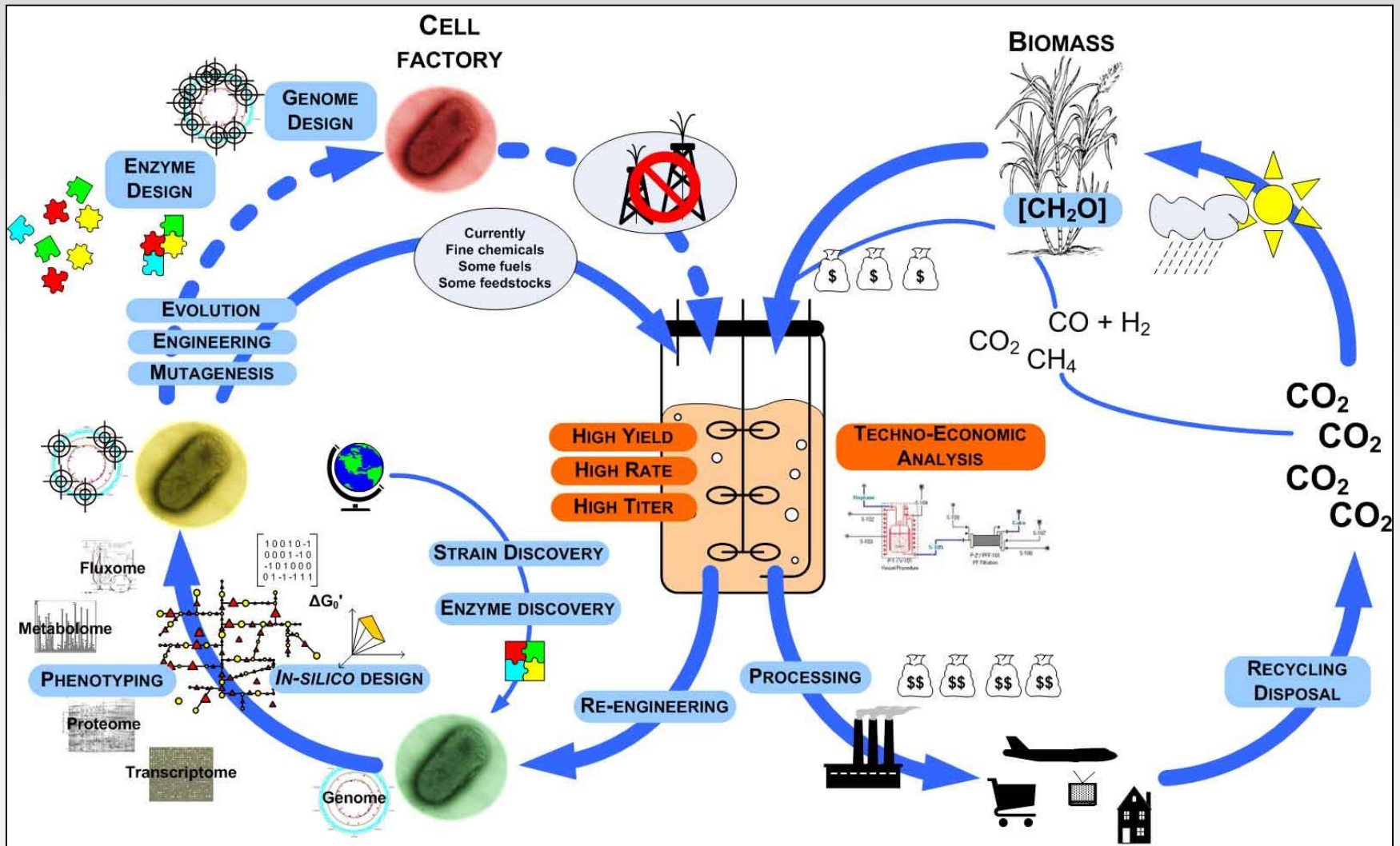


Biobased chemicals unsubsidized cost equivalent range to be competitive

www.biofuelsdigest.com/bdigest/2015/01/12/eight-under-70-which-biofuels-ventures-can-beat-out-cheap-oil/

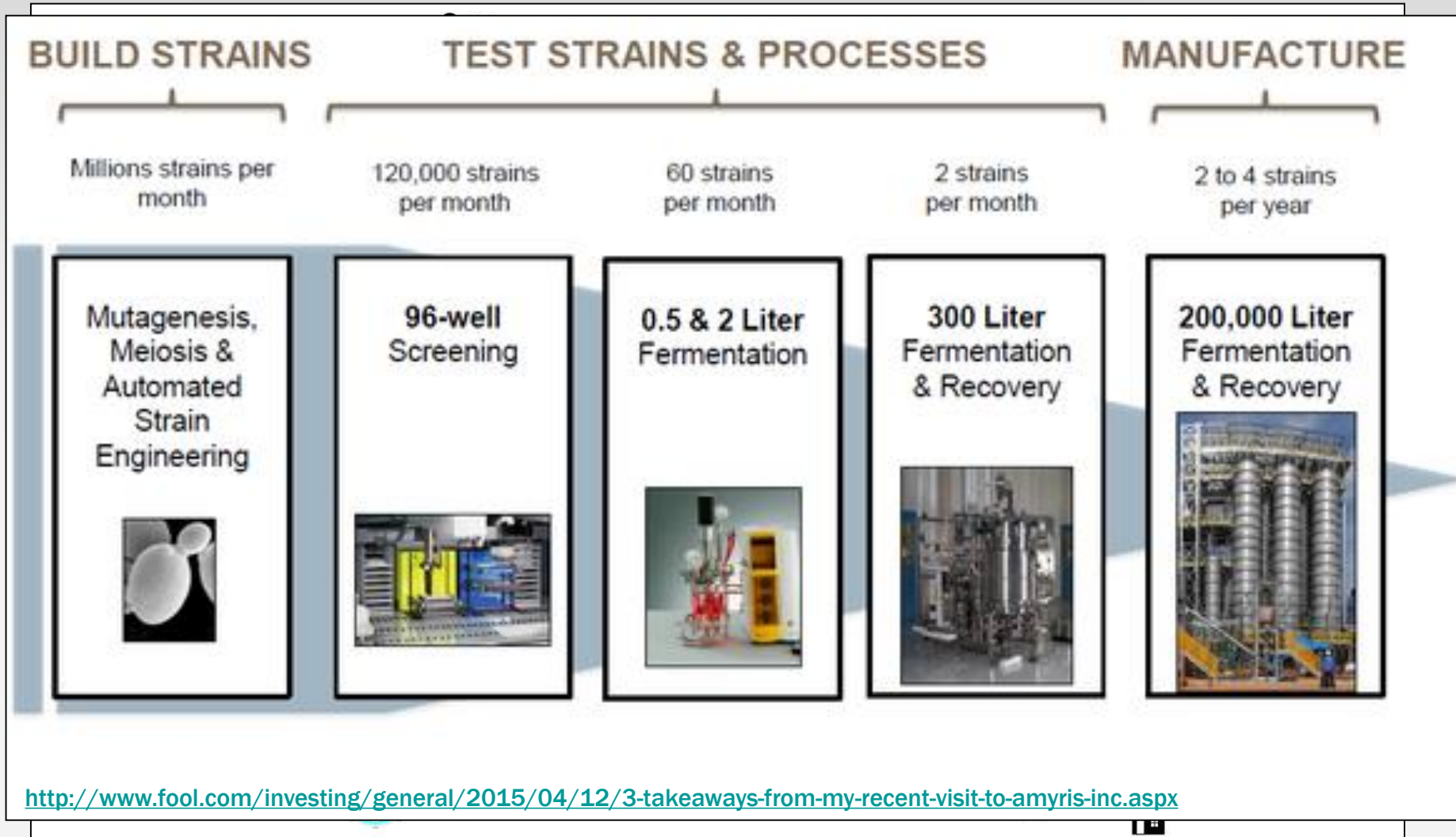


Metabolic engineering





Metabolic engineering



<http://www.fool.com/investing/general/2015/04/12/3-takeaways-from-my-recent-visit-to-amyris-inc.aspx>





Fermentation of “pharmaceuticals”

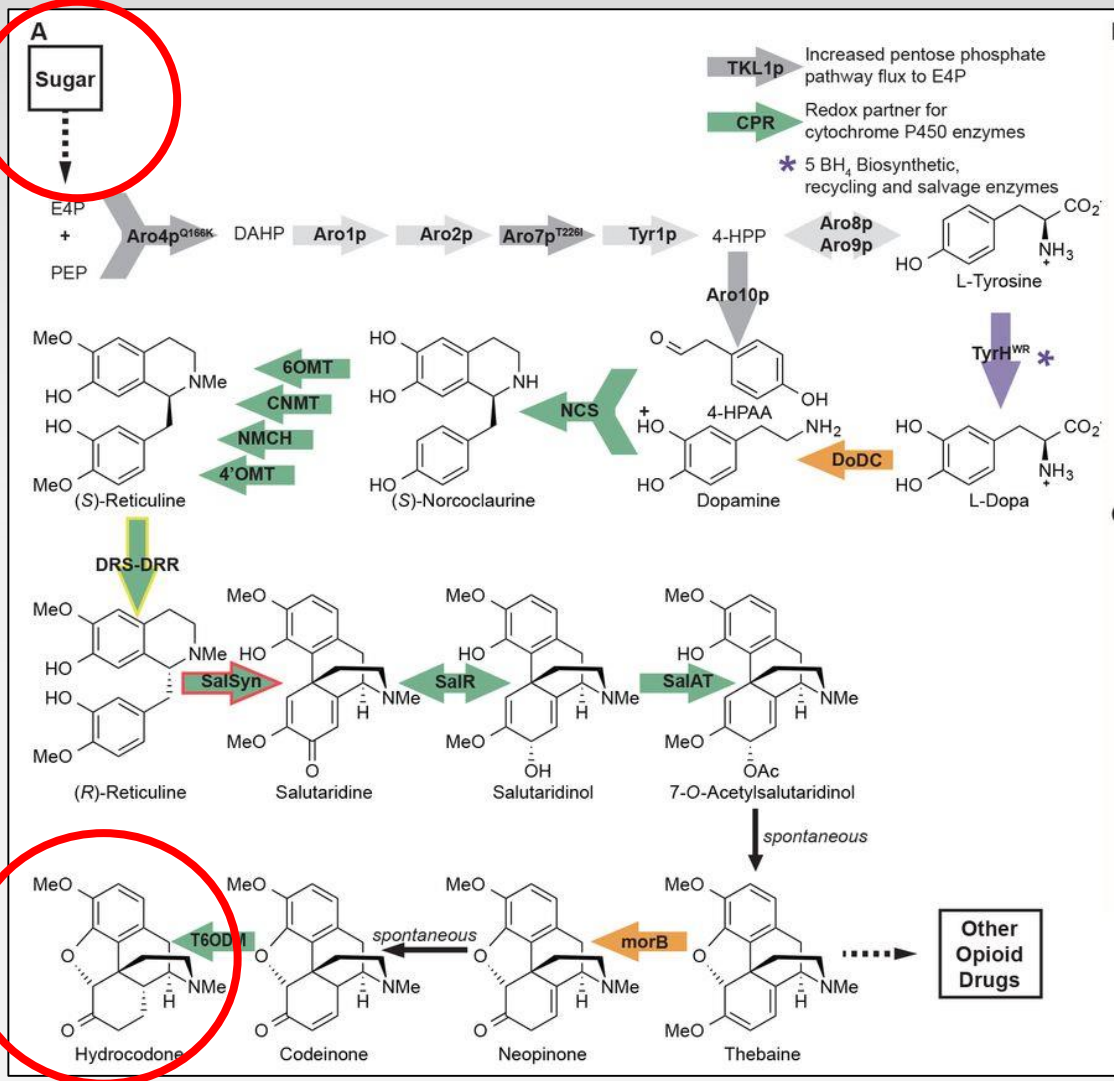
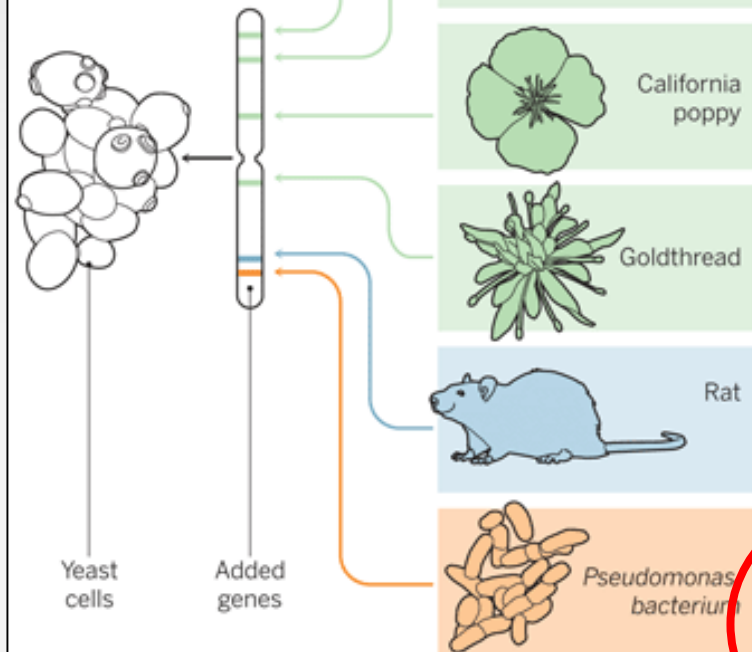




The potential of bio-based speciality chemicals

New opiate factory

To engineer yeast to make opiates, researchers outfitted the microbes' chromosomes with genes from a rat (blue), a bacterium (orange), and several plants (green), including three forms of poppies.



Science DOI: 10.1126/science.aac9373



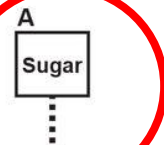
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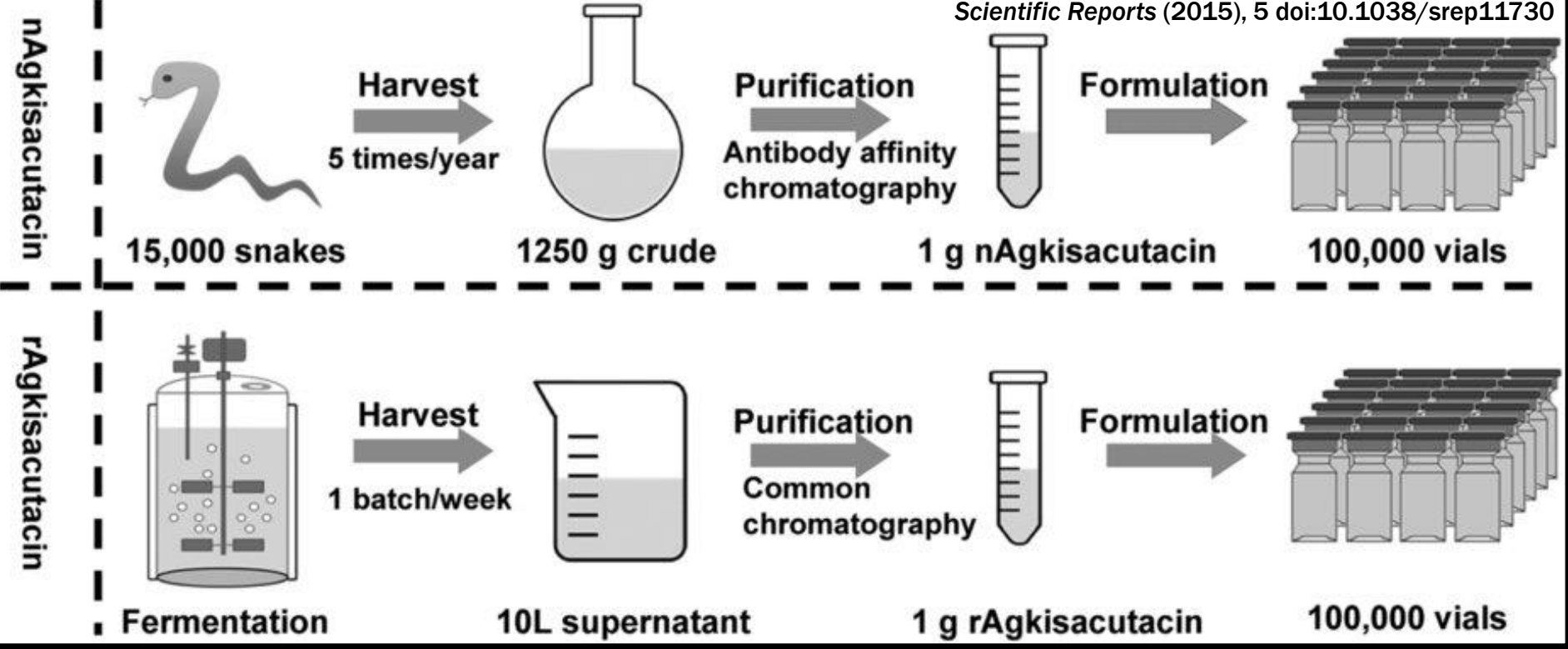
To engineer yeast to make opiates, researchers outfitted the microbes*



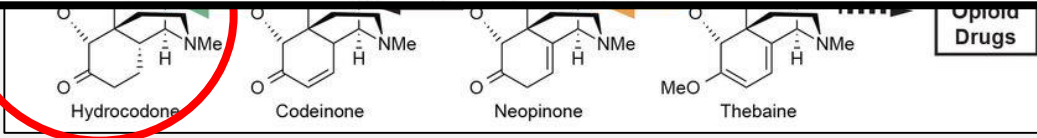
Iranian poppy



TKL1p → Increased pentose phosphate pathway flux to E4P
CPR → Redox partner for cytochrome P450 enzymes

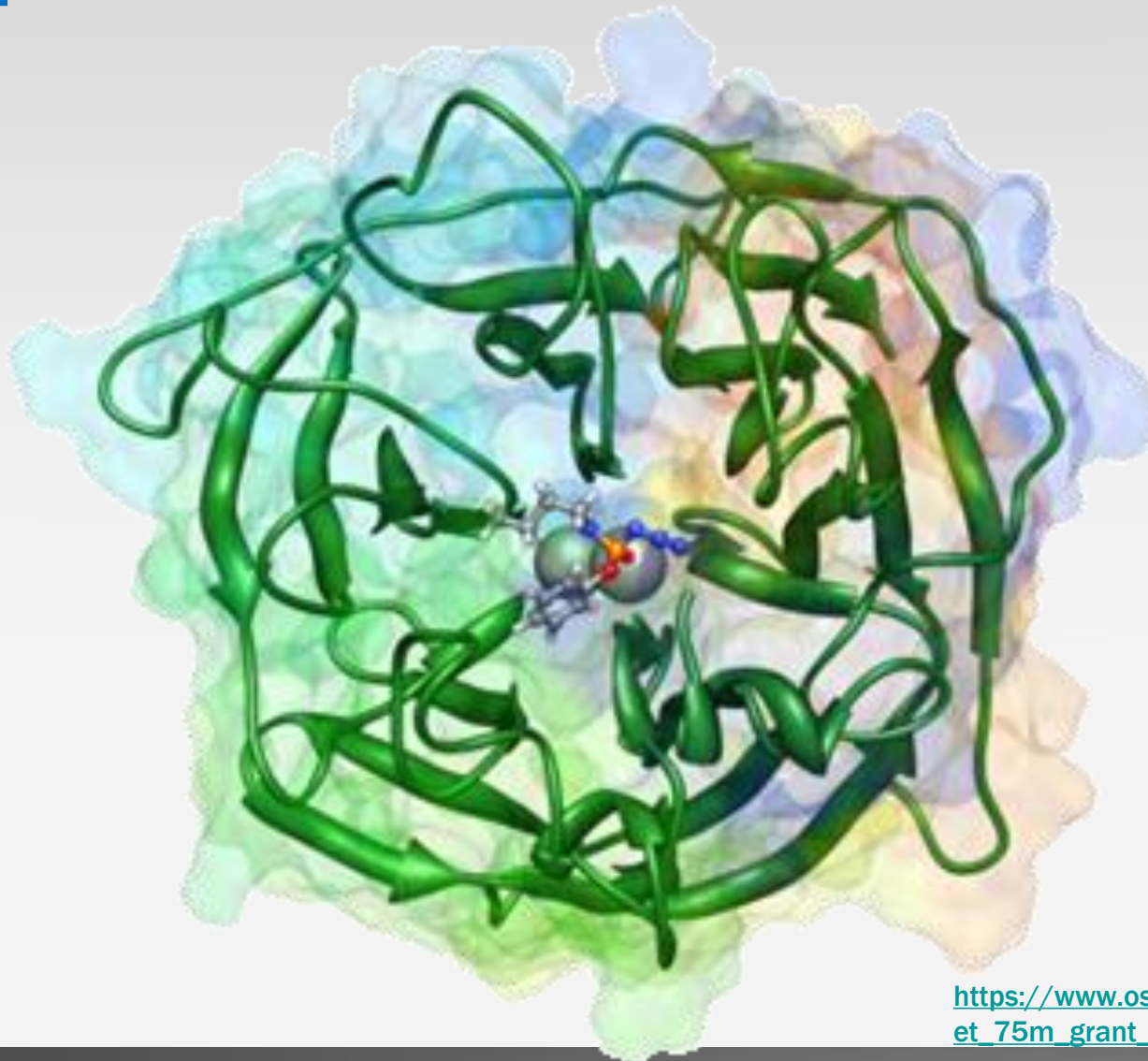


Science DOI: 10.1126/science.aac9373





The potential for more effective countermeasures

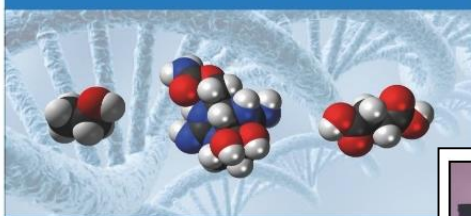


https://www.osc.edu/press/researchers_get_75m_grant_to_combat_nerve_agents



S&T review requires “Convergence of Science and Diplomacy”


19th Conference of the States Parties




Science for Diplomats
The Science of the Bioeconomy

13:30 – 15:00
Friday, 5 December
World Forum – Europe Room


Light Lunch Provided

ORGANISATION FOR THE
PROHIBITION OF CHEMICAL WEAPONS 

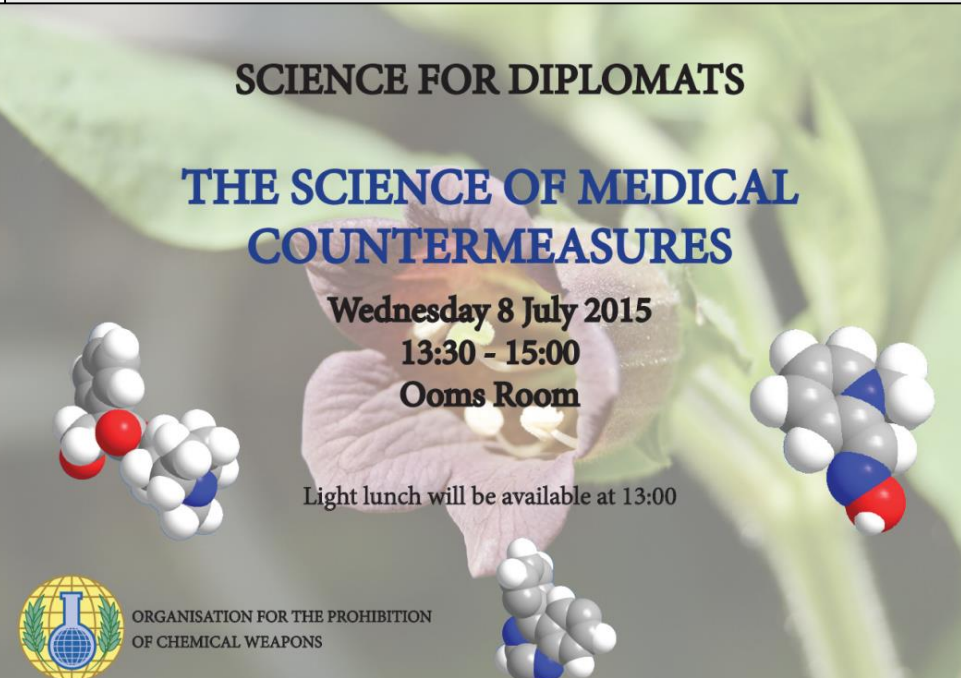
Science for Diplomats
**Schedule 1 Chemicals in
Industrial Processes**



17 March 2015
13:30 - 15:00
Ooms Room


ORGANISATION FOR THE
PROHIBITION OF CHEMICAL WEAPONS 

SCIENCE FOR DIPLOMATS
**THE SCIENCE OF MEDICAL
COUNTERMEASURES**



Wednesday 8 July 2015
13:30 - 15:00
Ooms Room

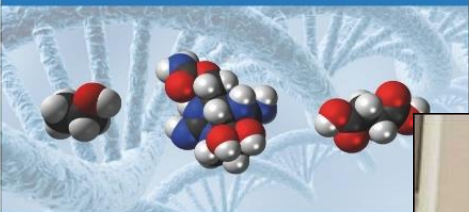
Light lunch will be available at 13:00

ORGANISATION FOR THE PROHIBITION
OF CHEMICAL WEAPONS 



S&T review requires “Convergence of Science and Diplomacy”

19th Conference of the States Parties



Science for Diplomats
The Science of the Bioeconomy

13:30 – 15:00
Friday, 5 December
World Forum – Europe Room

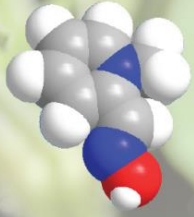
Light Lunch Provided

ORGANISATION FOR THE PROHIBITION OF CHEMICAL WEAPONS




SCIENCE FOR DIPLOMATS
THE SCIENCE OF MEDICAL MEASURES


Friday 2015
13:00
15:00



ORGANISATION FOR THE PROHIBITION OF CHEMICAL WEAPONS



ORGANISATION FOR THE PROHIBITION OF CHEMICAL WEAPONS




Light lunch will be available at 13:00



Communication, education and awareness

VOLUME 2 NUMBER 7



The OPCW Science & Technology Monitor

A sampling of Science & Technology Relevant to the Chemical Weapons Convention

1 June 2015

In This Issue

- Medical Countermeasures
- Chemical Forensics
- OPCW Research Projects Support Programme

Featured content

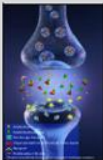



Image from [DuoDate®](#)
Medical countermeasures at work in a synapse.



Fingerprinting chemicals.

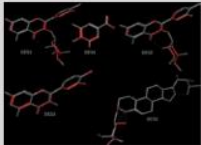


Image from [EloS One, 2013 Nov, 8\(11\)](#)
Drug discovery research in OPCW Supported Research Projects

Welcome


Welcome to the *OPCW Science and Technology Monitor*, an occasional bulletin to provide updates on developments in science and technology across a broad spectrum of topics relevant to the CWC. Past issues are available from the [Science and Technology section of the OPCW website](#).

Thanks to all of you who have taken our survey. For those who have not yet responded, the survey is still open ([click here](#)). There are only six questions, all easier than the puzzle (we promise) and all responses are anonymous. Your feedback is highly appreciated!

Today marks the 25th anniversary of the [signing of the 1990 Chemical Weapons Accord by the United States of America and the Soviet Union](#). This agreement, which pre-dated the CWC, marks one of many steps taken in the journey toward a world free of chemical disarmament have been supported by the science of chemistry itself; a scientific field that provides opportunities for international collaborations and brings forth new developments with peaceful economic and technological benefits. [As we move into the future, we look forward to a wealth of new discoveries from this evolving scientific field.](#)

The S&T Puzzle

We once again congratulate our colleagues at the [CTBTO](#), whose entry correctly recognized four of the top five spoken words of the Director-General in the eight statements delivered [from 22 January to 29 April 2015](#) (in case you were wondering, they missed "States"). The prize for best visualisation of the words of the Director-General, however, goes unclaimed as no submissions (except our own, below) were received. Puzzle statistics now stand at: VER 4, OSP 2, OCS 1, INS 1 and CTBTO 3.



For this edition of the puzzle, we look at the multiple uses of a cup of coffee. Can you tell us the identity and LD₅₀ (that's right, the median lethal dose) of the most abundant chemical in the cup; the [molarity \(M\)](#) of caffeine (molecule above); and the LD₅₀ of coffee itself? To keep this simple, assume this coffee is made with [Arabica beans](#) and brewed by a certified procedure (for



EDUCATION AND ENGAGEMENT: Promoting a Culture of Responsible Chemistry

FINAL REPORT OF THE SCIENTIFIC ADVISORY BOARD'S TEMPORARY WORKING GROUP

NOVEMBER 2014

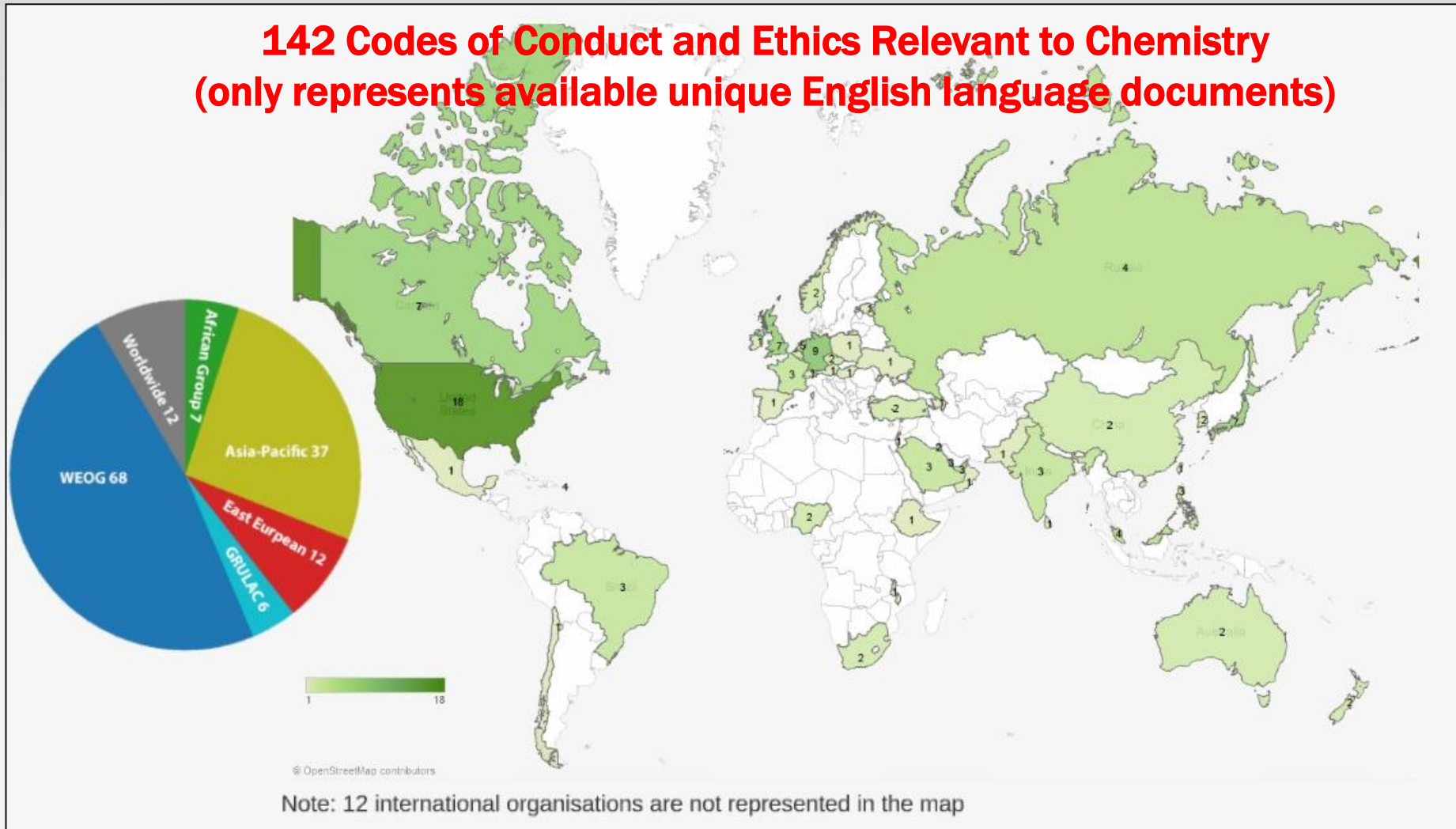


ORGANISATION FOR THE PROHIBITION OF CHEMICAL WEAPONS



Does science need more codes?

**142 Codes of Conduct and Ethics Relevant to Chemistry
(only represents available unique English language documents)**



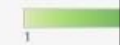
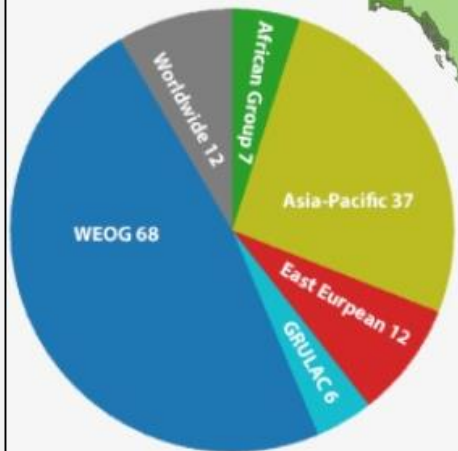
© OpenStreetMap contributors

Note: 12 international organisations are not represented in the map



Does science need more codes?

142 Co
(only repre



© OpenStreetMap

Note: 12 i



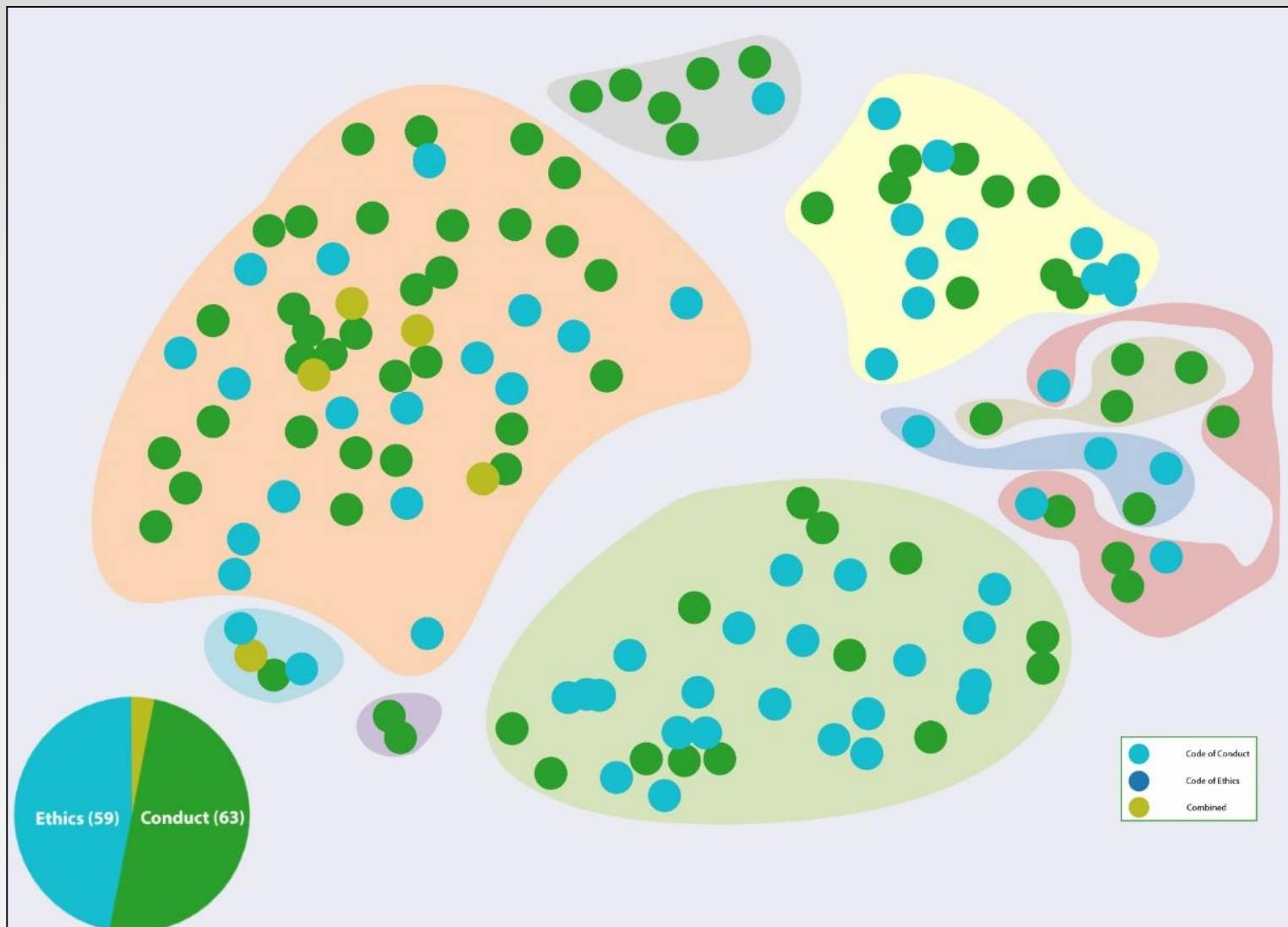
Chemistry
documents)



Type of organisations

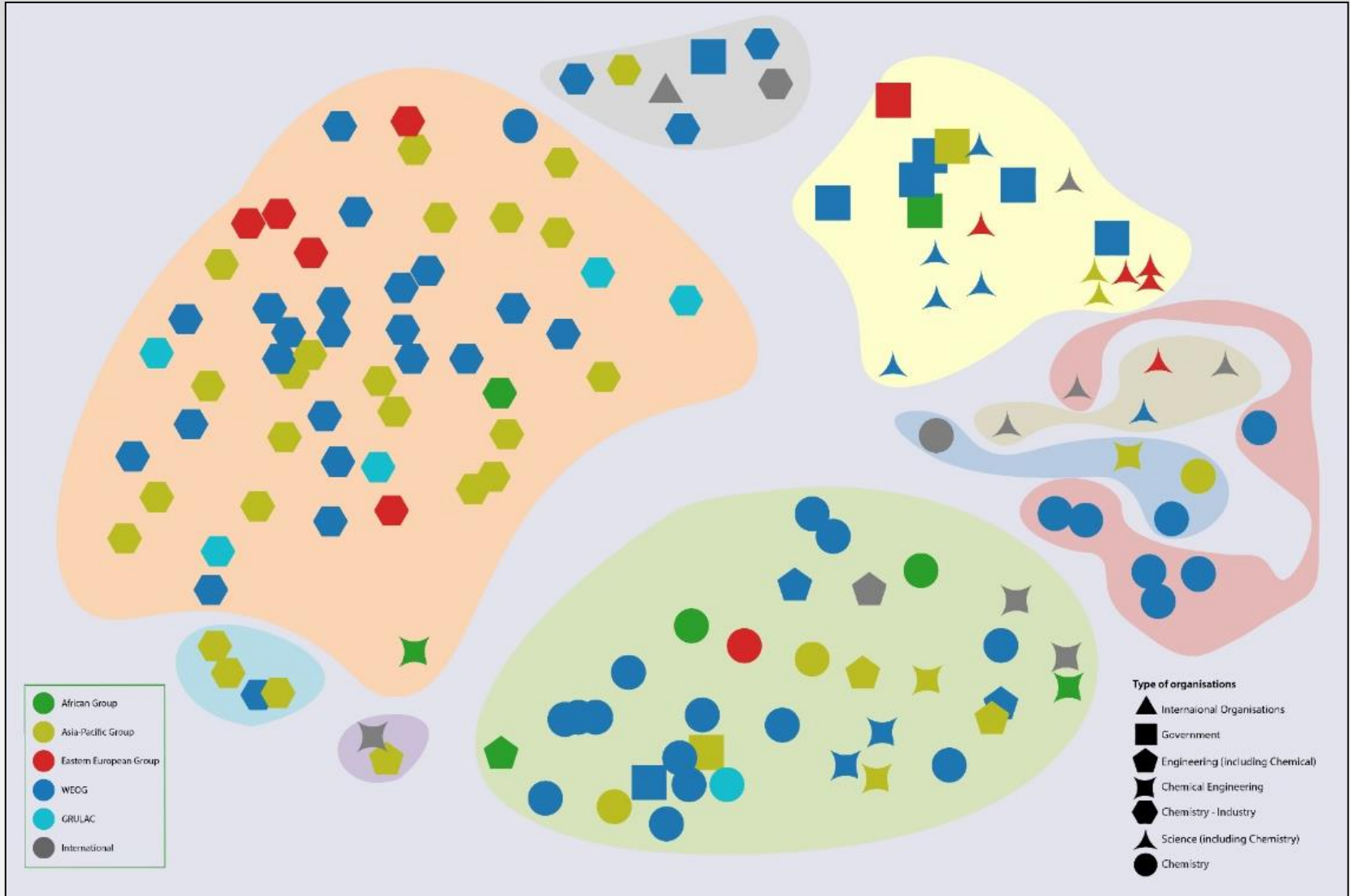


What do all these codes tell us?





What do all these codes tell us?





What do all these codes tell us?





Some perspectives on existing codes

- **“Cluster” by purpose of Organisation**
 - Not region or type of code
- **Engagement requires “connection” and “ownership”**
 - A means to facilitate discussion
- **Codes are living documents – they will need to evolve with our changing world**
- **Elements facilitate engagement**
- **Concepts have similarity across scientific disciplines**

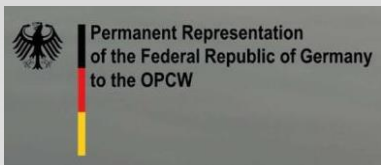


ORGANISATION FOR THE
PROHIBITION OF CHEMICAL WEAPONS

Working together for a world free of chemical weapons



THE HAGUE ETHICAL GUIDELINES



The Hague Ethical Guidelines

Participants of 2nd Workshop

Guidelines endorsed by :



- Professor Muhamad Abdulkadir (Indonesia)
- Professor Jasim Uddin Ahmad (Bangladesh)
- Professor Abeer Al-Bawab (Jordan)
- Professor Fernando Albericio Palomera (Spain)
- Professor Jan Apotheker (The Netherlands)
- Professor Mahdi Balali-Mood (Islamic Republic of Iran)
- Professor Djafer Benachour (Algeria)
- Dr Mark Cesa (United States of America)
- Professor Al-Nakib Chowdhury (Bangladesh)
- Dr Philip Coleman (South Africa)
- Professor Dr Hartmut Frank (Germany)
- Professor David Gonzalez (Uruguay)
- Professor Alastair Hay (United Kingdom of Great Britain and Northern Ireland)
- Mr Steven Hill (United States of America)
- Professor Dr Henning Hopf (Germany)
- Dr Jo Husbands (United States of America)
- Professor Jorge Guillermo Ibañez Comejo (Mexico)
- Mr Amirhossein Imani (Islamic Republic of Iran)
- Dr Nancy Jackson (United States of America)
- Dr Patrick John Lim (Philippines)
- Professor Mohd Jamil Maah (Malaysia)
- Dr Detlef Maennig (Germany)
- Professor Peter Mahaffy (Canada)
- Dr Robert Mathews (Australia)
- Professor Temechegn Engida (Ethiopia)
- Dr Kabrena Rodda (United States of America)
- Dr Ting Kueh Soon (Malaysia)
- Professor Alejandra Graciela Suarez (Argentina)
- Professor Leiv K. Sydnes (Norway)
- Mr Cheng Tang (China)
- Professor Natalia P. Tarasova (Russian Federation)
- Dr Christopher Timperley (United Kingdom of Great Britain and Northern Ireland)
- Dr Hans-Georg Weinig (Germany)
- Dr Prashant Yajnik (India)
- Dr Muhammad Zafar-Uz-Zaman (Pakistan)
- Professor Zuriati Binti Zakaria (Malaysia)
- Mr Muhammad Setyabudhi Zuber (Indonesia)



Bangladesh Chemical Society



中华人民共和国工业和信息化部

Ministry of Industry and Information Technology of the People's Republic of China



Background

The responsible practice of chemistry improves the quality of life of humankind and the environment. Through their many peaceful uses, such as in research and industry, chemicals play an essential role in this improvement. However, some chemicals can also be used as chemical weapons or to create them, and these weapons are among the most horrific in the world.

The 1993 Chemical Weapons Convention (CWC) embodies the powerful international norm against chemical weapons, requiring its States Parties “never under any circumstances: (a) To develop, produce, otherwise acquire, stockpile or retain chemical weapons, or transfer, directly or indirectly, chemical weapons to anyone; (b) To use chemical weapons; (c) To engage in any military preparations to use chemical weapons; (d) To assist, encourage or induce, in any way, anyone to engage in any activity prohibited to a State Party under this Convention.” The task of destroying the world’s declared stockpiles of chemical weapons is close to completion, but the threats that the use of chemicals as weapons pose to global security have not yet been eliminated.

As destruction of the remaining chemical weapons continues, a concerted effort is needed to prevent their re-emergence. This includes training and raising awareness among chemistry practitioners, defined as anyone trained in chemistry as well as others dealing with or handling chemicals. Their support is needed so that production and use of chemicals is accompanied by recognition of the responsibility to ensure that they are applied solely for peaceful and beneficial purposes. Fortunately, ethical standards established by the global chemistry community already provide a foundation. Building on that foundation, a group of experts from 24 countries from all regions of the world convened to define and harmonize key elements of ethical guidelines as they relate to chemical weapons based on existing codes.¹

Such codes are primary ways through which the community’s ethical standards are addressed. The key elements presented in this text should be incorporated into new and existing codes in order to align with the provisions of the CWC. A code need not mention chemical weapons or the CWC to support its basic goals, and provisions may need to be tailored for particular sectors or circumstances, while still reflecting the fundamental values. Taken together, “The Hague Ethical Guidelines” provide the key elements that should be applied universally.

¹“Code” is used as a general term and includes the full range of such documents, from aspirational statements such as the Hippocratic Oath to codes that are enforceable, for example as part of a practitioner’s terms of employment.

The Key Elements

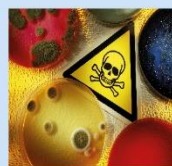
Core element. Achievements in the field of chemistry should be used to benefit humankind and protect the environment.



Sustainability. Chemistry practitioners have a special responsibility for promoting and achieving the UN Sustainable Development Goals of meeting the needs of the present without compromising the ability of future generations to meet their own needs.

Education.

Formal and informal educational providers, enterprise, industry and civil society should cooperate to equip anybody working in chemistry and others with the necessary knowledge and tools to take responsibility for the benefit of humankind, the protection of the environment and to ensure relevant and meaningful engagement with the general public.



Awareness and engagement. Teachers, chemistry practitioners, and policymakers should be aware of the multiple uses of chemicals, specifically their use as chemical weapons or their precursors. They should promote the peaceful applications of chemicals and work to prevent any misuse of chemicals, scientific knowledge, tools and technologies, and any harmful or unethical developments in research and innovation. They should disseminate relevant information about national and international laws, regulations, policies and practices.

Ethics. To adequately respond to societal challenges, education, research and innovation must respect fundamental rights and apply the highest ethical standards. Ethics should be perceived as a way of ensuring high quality results in science.



Safety and Security. Chemistry practitioners should promote the beneficial applications, uses, and development of science and technology while encouraging and maintaining a strong culture of safety, health, and security.

Accountability. Chemistry practitioners have a responsibility to ensure that chemicals, equipment and facilities are protected against theft and diversion and are not used for illegal, harmful or destructive purposes. These persons should be aware of applicable laws and regulations governing the manufacture and use of chemicals, and they should report any misuse of chemicals, scientific knowledge, equipment and facilities to the relevant authorities.



Oversight. Chemistry practitioners who supervise others have the additional responsibility to ensure that chemicals, equipment and facilities are not used by those persons for illegal, harmful or destructive purposes.

Exchange of information.

Chemistry practitioners should promote the exchange of scientific and technical information relating to the development and application of chemistry for peaceful purposes.

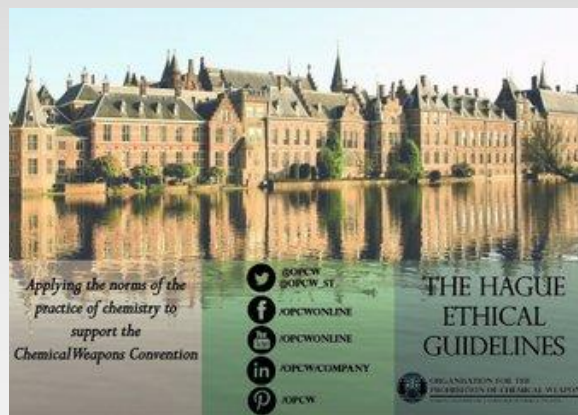


The Participants of the Second Workshop on Ethical Guidelines for the Practice of Chemistry under the Norms of the Chemical Weapons Convention (CWC).

More information is available at <https://www.opcw.org/special-sections/science-technology/the-hague-ethical-guidelines/>



The guidelines are now available in the six official languages of the OPCW



www.opcw.org/special-sections/science-technology/the-hague-ethical-guidelines



SAB engagement with States Parties



SAB-22

EC-80

Industry Cluster

BWC MX & MSP

Similar high level
of engagement is
planned for 2016

Presentations available: OPCW and BWC websites



Navigating the OPCW S&T website

<https://www.opcw.org/special-sections/science-technology/science-technology-resources/>

