

# An Analysis of the Concept Scientific Evidence of Technologies as it Relates to NASA's TRLs & Technoscience, Medicine, and Homoeopathic Therapeutics

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**Key Words:** Homoeopathic Therapeutics; Scientific Evidence of Technologies; NASA's TRLs; Technological Experimentation; Technological Verification

## Introduction

Homoeopathic therapeutics (HTS) spread due to their 'distinct superiority'<sup>1</sup> in treating many life-threatening epidemics across Europe and America during the 1800s.<sup>2,3,4</sup> However, HTS is now subjected to randomised controlled trials (RCTs) of the dominant system of medicine (medicine), which results in the 'efficacy-effectiveness paradox'.<sup>5</sup> The 'efficacy-effectiveness paradox' depicts the fact that HTS is very effective clinically, but fails to elicit conclusively its experimental efficacy via RCTs.<sup>5</sup> The paradox is exacerbated by the claim that the 'scientific validity' of therapies is not dependent on its success rate, but that it should be consistent with a 'pathophysiological, biochemical, and pharmacological theory or rationale'.<sup>6</sup> Furthermore, the theory underpinning HTS, the 'similia' (similarity), is deemed an unscientific metaphysical principle.<sup>7</sup> The scientific validity of the similarity can thus not be assessed within a scientific framework.<sup>8</sup> Moreover, individualised therapeutics is 'utterly unscientific'; how can one know the effect of a treatment if it's used only once?<sup>9</sup> However, are the preceding facts valid, philosophically, scientifically and technologically?

What then is science? 'Science is the attempt to learn the truth about those parts of nature that are explorable. Science, therefore, is not a mechanism to explore the unexplorable.'<sup>10</sup>

People world-wide explore their environment according to their world-view and expressions.<sup>11</sup> They hence fashion products for their survival.<sup>12</sup> However, scientific evidence must be discovered, not invented or created.<sup>13</sup> And the demarcation between a scientific theory and pseudoscience has consequences as it affects the scientific and legal validity of therapies.<sup>14,15,16</sup>

What are technologies? A technology is an as yet to be matured entity; when the technology is mature and commercially available, it's a product.<sup>17</sup> People used their sciences to fashion technologies and products.<sup>12</sup> Hence, the Incas discovered the strength of their grasses to fashion ropes, and then bridges, in order to cross gorges.<sup>18,19</sup> And modern man accepted science due to its powerful products on which man has become addicted.<sup>20</sup>

What is the scientific evidence of the products of science?<sup>17</sup> The scientific evidence of products is now judged by means of the National Aeronautical and Space Administration's Technology Readiness Levels (NASA's TRLs)<sup>17,21,22,23</sup> and Technoscience's principles.<sup>24,25,26</sup> TRLs assess the maturity of any technology, including drugs, by considering what is being done, under what conditions, at any given point in time. NASA's TRLs and Technoscience deem the scientific evidence of a product as its successful worthy real-life result, attained by a mature and tested

product, demonstrated by a competent user.<sup>17,21,22,23,24,25</sup>

Medicines are in the technological realm.<sup>27</sup> However, the essence of the profession of medicine centres on the outcomes for the 'particular patient', termed 'medicine qua medicine'.<sup>28</sup> Matching a therapy for the disease of the individual patient has been a supreme problem in the history of medicine.<sup>29,30,31</sup> Nevertheless, the nature of the evidence which warrant the use of medical therapeutic technologies is highly disputed.<sup>32</sup> Despite that, RCT evidence provides a therapy with a marketing licence.<sup>33</sup> This represents experimental evidence, in stark contradiction to that of Technoscience.<sup>17,21,22,23,24,25</sup>

How then does one investigate HTS in a 'truly scientific manner'<sup>34</sup>, especially since the arguments against HTS invoke not only the sciences, but Technoscience as well.<sup>5,6,7,8,9</sup> And the sciences are those of, e.g., Newton and Einstein, and their powerful products.

Medicine is an applied science and art.<sup>34,35,36,37</sup> Thus, 'Science explains what is; engineering creates what never was. Physics and chemistry are science, but not engineering.'<sup>38</sup> Medicine therefore resembles Technoscience as an applied science, and art. Hence, the validity of homoeopathic therapeutics will be analysed appropriately via a systems approach<sup>39,40</sup>, which employs as benchmark the philosophy and

history of medicine, and of the natural sciences, NASA's TRLs, and Technoscience's principles.

## Materials and Methods

This is a conceptual analysis of the principles of science, theories, and the scientific evidence of technologies and products. The results thereof will be employed in an analysis on the scientific and technological validity of HTS.<sup>41</sup> This process is termed the 'analytical thought experimentation', which 'bulks so large in the writings of Galileo, Einstein, Bohr, and others', to unlock riddles in their field with a 'clarity' which were 'unattainable in the laboratory'.<sup>42</sup> Furthermore, the benchmark institutions are employed as their products allowed man to accept science.<sup>20</sup>

## The Philosophy of Scientific Theories

The conceptualisation of science will be explored by an analysis of the works of a number of authors. Its analysis required thinking outside the black box of medicine; to be an 'epistemological opportunist'.<sup>43</sup> As such, consulted were the works of Paul Feyerabend,<sup>12 34 44 45</sup> Thomas Kuhn,<sup>42 46</sup> Imre Lakatos,<sup>14 47 48</sup> as well the Philosophy of Science: The Central Issues.<sup>49</sup> This unravelled science as bugaboo, employed to subjugate alternative systems.<sup>12 50</sup> HTS is not studied dispassionately<sup>3 4 51</sup> due to dogmatism, condemned by Lord Francis Bacon.<sup>52</sup> Of importance, science and technology are the 'creatures'<sup>53</sup> of men, designed with their limited intelligence.<sup>54</sup>

## The Principles of Technoscience: Experimentation and Demonstration

Technoscience is explored to clarify definitions such as the vital difference between experimentation, and

demonstration of technologies.<sup>55</sup> Experimentation and demonstrations represent respectively the laboratory,<sup>55 56 57</sup> and operational environments, of technologies.<sup>24 25 53 58</sup>

Furthermore, NASA's TRLs,<sup>21 22 59</sup> and Technoscience's<sup>24 25 60 61</sup> principles, and their products are explored, such as the Airbus A 380 aircraft.<sup>26 62 63 64 65</sup>

## The Philosophy of the Profession of Medicine

'Medicine qua medicine' is the medical benchmark.<sup>28 66</sup> It keeps the analysis focussed. Without it the essence of the profession would be murky, allowing RCTs, e.g., to become its essence.

The history of medicine,<sup>35 67 68 69</sup> especially that concerning Dr Samuel Hahnemann,<sup>4 29 70 71 72 73</sup> and the world of medicine's reaction to his therapeutic system, is analysed.<sup>3 4 74</sup>

Furthermore, an analysis of the scientific validity of individualised therapeutics for the disease of the 'particular patient'<sup>3</sup> will be undertaken. This will be explored in the light of the similarity and provings with reference to the works of Hahnemann,<sup>29 70 71</sup> and the principles of medicine.<sup>7 8 9 33 75</sup>

## Human Competency

The users of technologies will be explored in brief via the work of Thomas Gilbert.<sup>76</sup>

## Results of the Conceptual Analysis

The results of the conceptual analysis of the scientific evidence of technologies and products within the benchmark institutions will be presented first. The results of the benchmark institutions will be employed to analyse the scientific evidence of medicine, and HTS.

## The Benchmark Institutions

The benchmark institutions are employed since science 'won its place in society' due to the 'prodigious powers of performance' of its 'products', which modern societies 'have become dependent upon...as an addict on his drug'.<sup>20</sup> However, which products are addictive? The addictive powerful products referred to are, for example, aircraft, cell phones, and motor cars.

## Theories and Science; The Philosophy and History of Science

What is science? 'Science is the attempt to learn the truth about those parts of nature that are explorable. Science, therefore, is not a mechanism to explore the unexplorable.'<sup>10</sup> People world-wide developed their sciences long before Western science arose.<sup>11 12</sup> The Incas build suspension-bridges fashioned from their local grass.<sup>18 19</sup> The Polynesians sailed the Pacific Ocean to Hawaii and California A.D. 400-800, and steered the ships of Magellan and Captain Cook.<sup>77 78</sup> The Coahuila Indians lived off an apparent arid land as they knew an abundance of wild food sufficient for several thousand Indian inhabitants.<sup>79 80</sup> The Incas, Polynesians and the Coahuila Indians were adaptable and inventive, and there's no "single comprehensive 'world-view of science'".<sup>12</sup>

Science is an intellectual activity of men.<sup>10 12 81</sup> The nature of this activity has been scrutinised since the Greeks, but termed and formalised as the 'scientific method' since Lord Francis Bacon.<sup>52</sup> The concept, science, differs widely, from that of the Incas, to a modern rigid methodology.<sup>81</sup> Max Born<sup>81</sup> and Paul Feyerabend<sup>12</sup> confirmed the absence of a 'scientific method'. Max Born likened research to traversing a jungle by trial and error, devoid of 'epistemological signposts'.<sup>81</sup> Albert Einstein's wrote that a

scientist must be an 'epistemological opportunist'.<sup>43</sup>

However, professionalisation enforces uniformity in thinking and methods, leading to dogmatism.<sup>50</sup> In consequence, scientists do not 'aim to invent new theories' and are 'intolerant to those invented by others'.<sup>42</sup> Scientists thus demand theoretical and methodological monopoly and rigour—such monopolies were historically nonexistent, and would have hampered scientific progress.<sup>12 14 47</sup> As such, Lakatos said: 'Blind commitment to a theory is not an intellectual virtue: it is an intellectual crime'.<sup>47</sup>

What then makes evidence, or a theory, 'scientific'? Evidence must be discovered, not invented or created.<sup>13</sup> However, Imre Lakatos looked beyond most 'isms' (e.g., inductivism, falsificationism)—he stopped asking whether a theory is true or false, but whether it has 'positive heuristics',

i.e. 'problem-solving and anomaly-digesting'? Hence Einstein's general theory of relativity solved the planet Mercury's problematic orbit.<sup>49</sup> The programme must also provide for novel facts, such as 'Einstein's prediction of the curvature light', and must be 'empirically progressive', i.e., that 'the theory is judged by its growth, and its growth must be marked'. Importantly, some theories achieved their victories only after 'having passed through dramatic confirming instances', and are 'shattered by verifications rather than crucial experiments'.<sup>14 47</sup> For example, Halley applied Newton's laws, plus all relevant data on a comet, and calculated its return to the same spot in space after 72 years—he was stunningly out by a few minutes. This verification ended the French Academy's prizes to disprove Newton's theory.<sup>14</sup>

However, the successful outcomes of so-called 'non-scientific' systems

are dismissed. However, science is not always successful—if successful, the successes are not due to a uniform 'scientific' procedure, which does not exist.<sup>12</sup> Furthermore, scientists are like architects who 'can be judged only after the event', whether their structure remains standing, or collapses—nobody knows beforehand.<sup>12</sup>

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## Scientific Evidence of Technologies and Products

Products have been fashioned for more than one hundred thousand years.<sup>24 82 83</sup> Technologies are invented metaphysically before made into useful and successful products—something useful for society.<sup>17 25</sup> Thus, 'Science is a marriage between metaphysics and technology.'<sup>84</sup> Metaphysics is not a bugaboo, and the 'metaphysical' claim against the similarity is erroneous.<sup>7</sup>

A technology, or product, denotes an artefact's manufacturing processes, and its know-how.<sup>58</sup> The procedures of Technoscience were already defined in 17<sup>th</sup> century England by scientists who differentiated between experimentations and demonstrations.<sup>55</sup> The Royal Society expected experiments to be perfected at home (in private settings), and only presented in public for a demonstration (shows) when in good order—it was intolerant to 'failed shows'.<sup>55</sup>

Experiments are done in laboratories, and discussed between peers in highly technical language.<sup>57</sup> The laboratory environment can confirm if a technology works according to its founding principles.<sup>23</sup> Experiments can induce debates, potentially ad infinitum, about the correctness of the experiment and its results, termed 'experimenter's regress'.<sup>53</sup> However, relatively few experiments within, e.g., quantum physics were 'really important' and 'awesome'.<sup>47</sup> And it's unwise to put too much trust in experimental results.<sup>45</sup>

Scientists, particularly those in Technoscience, cannot claim any success of their work on the basis of their experimental results only, and should not portray them as those of outside results.<sup>17 21 22 23 24 25 53</sup> Their products are made for customers who must successfully operate them in their uncontrolled operational environment—then only, with hindsight, can it be claimed that the experiment was successful.<sup>17 21 22 23 24 25 53</sup> As such, 'is not the application of science

outside of the laboratories the best proof of its efficacy, of the quasi-supernatural power of scientists?'<sup>57</sup> Thus, it's vitally important that 'demonstration and display on the one hand, and experiment on the other are not mistaken for one another.'<sup>53</sup> To reiterate, scientists are like 'architects', who 'can be judged only after the event'.<sup>12</sup>

Products must 'Work as it should'—customers' chief criterion of a 'high quality' product. It's estimated that 85% of new products fail since they do not do what they should 'due to a poor design.'<sup>24</sup> And 'quality cannot be built into a product unless it has been designed into it'.<sup>24</sup> For example, the wings of a Cessna plane, designed for low airspeeds, will be torn from a supersonic aircraft with powerful engines. The correct approach is to design from the outset wings for supersonic flight by means of the requisite theory and methodology.

The information discussed above is depicted in **Figure 1**; with the least mature technology, as red; mature and demonstrated, as green. Nolte et al's presentation provides more details.<sup>21</sup>

## NASA's TRLs

NASA's TRLs, Figure 1, as discussed by Nolte et al,<sup>21 23</sup> was formulated after an historical analysis of NASA's technological records going back to the 1960s.<sup>17</sup> TRLs are 'a systematic metric/measurement system' which allows for the assessment of the maturity of a technology, or a comparative assessment of different types of technologies.<sup>22</sup> For example, is the technology investigated to see if it can work according to its principles in the laboratory environment, then it's a TRL 1-3; TRL 4-6 deals with the integration and sophistication of complex systems, which may not be relevant to medicine; TRL 4 marks the end of experimentation. When a prototype works as it should in its operational environment, it's a TRL 7; if the final product has operated successfully on a mission, it's a TRL 9.<sup>21 23</sup>

Science and Technology			
Science	Experimentation	Testing Verification	Demonstration
Theories Hypotheses	Can It Work? If Yes – Testing.	To Verify How Well It Works. Does It Do What It Should Do?	Yes It Does! Scientific Evidence! Marketing!
Relevant NASA's TRLs			
Least Mature Technology	Experimental Technology	Maturing Technology	Mature Technology
TRL 1-2	TRL 2-3	TRL 4-7	TRL 8-9

Figure 1. NASA's TRLs and Technoscience's Procedures. What's the scientific evidence of their procedures?

**Testing/Evaluation of Technologies**

Testing determines whether the technology does what it must do to meet customer or consumer expectations, and not what the engineer or scientist wishes the customer to have.<sup>24 25</sup> Engineers employ four test types which mirror NASA's TRL 4-7. A successful type 4 test, or TRL 7, confirms the product's true capability for the first time. A 'true test' is an evaluation performed by the intended user during 'standard operations supported through the employment of normal resources', and never performed under ideal experimental conditions.<sup>24 25 53 55 57 58 60 61</sup> The customers' wishes—the inputs quantified mostly mathematically, are verified during testing via, e.g., data measurements and analysis.<sup>25</sup>

Tests are performed at test sites which must mimic the user conditions, such as arctic, tropical, altitude or desert conditions. For example, the Airbus A 380's new Trent 900 engine was subjected e.g. to the aeroengine fan-blade containment test by Rolls-Royce plc.<sup>63</sup>

**Medicine**

Therapeutics was based on three systems, AD 1796. First, 'destroy the fundamental cause'; second, 'the symptoms present were sought to be removed by medicines which produced an opposite condition'; and third, individualised therapeutics; therapeutic knowledge and experience which match the disease of the particular patient.<sup>29</sup> Of importance, the third system was still unresolved. It has been an immense problem throughout the history of medicine.<sup>29 31</sup>

Until about 1865 there were hardly useful therapies<sup>68</sup> and no theory and methodology for individualised therapeutics in traditional medicine.<sup>29 71</sup> Dr Alfred Stillé summarised the problems which troubled medicine in the 1860s.<sup>30</sup> He lamented the 'principles of therapeutics' in the presence of the imperfect knowledge of drug action even in the healthy body, and the lack of knowing what constitutes diseases.<sup>30</sup> He and others even employed the principles of homoeopathic drug provings to obtain therapeutic certainty.<sup>30 31 85</sup> But they rejected the similarity, which led to the collection of unusable drug symptoms and signs. As such, they discontinued their provings.<sup>3</sup>

**Theories and Science**

The essence of the profession of medicine is the worthy successful outcomes for the individual patient, termed 'medicine qua medicine'.<sup>28</sup>

Nevertheless, drug development accelerated between the 1930s-1960s due to the sophistication of chemistry. Chemistry, and the chance finding of drugs which had an effect, called the 'massive game of roulette', led to the 'cornucopia of drugs'.<sup>67</sup>

Figure 2 depicts The New Drug Development Process of the Food and Drug Agency (FDA).<sup>33</sup> Drug entities are sought which have a desired effect on a disease or condition. Thus, common phenomena are studied, as well as the effect of drugs on common surrogate end points, such as blood sugar levels.<sup>33 86 87 88 89</sup>

**Testing/Evaluation of Technologies**

Testing is a medical concept historically. A 'regular' doctor said in 1847 that 'The educated physician is justified in rejecting homoeopathy without testing it at the bedside' and if he seriously wishes 'their verification' he's deemed deranged.<sup>3</sup>

However, testing of therapies in medicine<sup>2</sup> is not performed before marketing as depicted in Figure 2, since, e.g., the FDA legalises a drug after a satisfactorily performed RCT, as confirmed on pages 4-10 of the FDA's handbook.<sup>33</sup>

**Scientific Evidence in Medicine**

Scientific evidence is the successful results of a mature product which does what it should do; a TRL 9.<sup>17 21 22 23 25 53 55 57 58 60 61</sup> What represents the scientific evidence of medicine's drugs? Following drug discovery, trials are performed, particularly the RCT. The RCT was developed as the 'science of controlled experiments' to direct medical practice.<sup>36</sup> The FDA's handbook<sup>33</sup> and Figure 2 depict that a drug at licensing has been assessed via clinical trials, mostly RCTs, which are the single most important factor for licensing.<sup>21</sup> What is done with the drug before marketing has confirmed that it works according to its principles within the laboratory environment, and attains only a TRL 3.<sup>21 22 23 33</sup>

Furthermore, the consequences of RCTs are: group similarities are studied; the individual patient is depersonalised; individual differences and peculiarities are excluded; and the patient's story is ignored.<sup>76</sup> As such, both drug development, and RCT evidence, rules out individuality in therapeutics.<sup>33 75</sup> Sir Bradford Hill said that population trials do not provide therapeutic guidance for the 'particular patient', and wondered whether such a way indeed exists.<sup>90</sup> Furthermore, extrapolating from groups to the individual remains unresolved, as it's 'fundamentally intractable'.<sup>91</sup>

Medicine's Scientific Evidence – FDA			
Pre-Clinical Research	Clinical Studies	New Drug Approval	Demonstration
Drug Developed	Phase 1 Trials	Testing Verification	No Demonstrations Before Marketing. Post-Marketing Surveillance.
Testing in Animals	Phase 2 Trials		
Review by Boards	Phase 3 Trials		
	Drug Licensed for Marketing		
Least Mature Technology	Experimental Technology	Maturing Technology	Mature Technology
	TRL 1-3 Pass	TRL 4-7 Fail	TRL 8-9 Fail

Figure 2. The New Drug Development Process. Tests from Test Tube to new Drug Application Review vs. NASA's TRLs.

RCT trial experimental evidence has universal legitimacy,<sup>92</sup> and its evidence is valued higher than outcomes research evidence.<sup>33 93 94</sup> But significantly, RCT evidence is not replicated in clinical practice obtained via outcomes research.<sup>86 87 88 95 96</sup> Hence, which are the best methods to elicit evidence?<sup>97</sup> As such, a hierarchy of evidence has been established to rank the importance of evidence.<sup>94</sup> Despite that, the nature of the evidence that should support the use of therapeutic interventions is 'hotly' and 'bitterly' argued.<sup>32</sup> However, hierarchies are termed illusionary,<sup>32</sup> and 'amazing nonsense', which confirms 'scientific illiteracy',<sup>98</sup> as they place RCTs on an unwarranted pedestal.<sup>32</sup>

Cardiothoracic surgeons on the contrary perform outcomes research on their procedures.<sup>99</sup> In response to this, some physicians now also call for outcomes audit in medical patients.<sup>100</sup> Professor Sir Bruce Keogh said that there must be a focus on outcomes in general. However, surgeons must be skilled and experienced to achieve the desired outcomes for the patient operated on; the individual patient. If not, they have no right to perform surgery.<sup>101</sup> This report reflects the real-life clinical outcomes of each individual cardiothoracic surgeon, and not RCT evidence which are clinically meaningless.<sup>86 95</sup>

However, the United States Army Medical Research and Material Command<sup>102</sup> misrepresented their Phase 3 experimental efficacy TRL 3 evidence, as TRL 8 operational evidence.

## Homoeopathic Therapeutics

Dr Hahnemann temporarily stopped practicing medicine from 1784, aged 29, disillusioned by the uncertainty and worthlessness of his profession.<sup>4 29 51 71 103</sup> He discovered during 1790 that a mild similar artificial disease cures the similar disease of the patient—the similarity.<sup>29</sup> From 1790-1796 he scoured the literature for individualised drugs employed by his predecessors. Sadly, he found none, and realised he had to initiate provings, but doubted whether he would survive this arduous task. He appealed to his colleagues for assistance via his essay on his new principle.<sup>29</sup> <sup>103</sup> Hahnemann was shocked by their unexpected harsh criticism to his request, despite the reality of therapeutic uncertainty. This led to his devastating critique of the profession of medicine, to teach them a lesson.<sup>71</sup> 'Simple-minded' Hahnemann, Dudgeon said, for doing to the profession what Luther did to the Roman Church; you should have kept your silence.<sup>103</sup> This exchange irreparably damaged the relationship between HTS and medicine ever since.<sup>3 4 103</sup>

### Theories, Science, Methodology: The Similarity and Provings

During a proving, knowledge and experience of a drug's action arises simultaneously during administering the drug to a healthy person.<sup>3 29 72</sup> The proving thus links diagnosis and therapy prior to a 'true' test. The successful 'true' test results inimitably link diagnosis, therapy, and outcomes, philosophically, scientifically, and technologically.

The similarity and provings will now be analysed by the benchmark institutions in a number of ways. They can be

confirmed as follows.<sup>49</sup> Discovery: Dr Hahnemann's intuition to ingest bark led to the discovery of provings.<sup>49</sup> Explanations: the similarity was known by Dr Hahnemann's predecessors<sup>29 103</sup> but his systematic research and practical use of the therapies explained the previously known theory.<sup>49</sup> Predictions: the similarity and provings are heuristics to discover the innumerable specific powers of therapies which could not have been foreseen, or known, or conjectured to be able to exist, by anyone in the medical profession,<sup>3 4 49</sup> such as, e.g., therapies made from inert metals, such as gold or metallic silver.<sup>4</sup>

Do the similarity and provings fulfil Lakatos' principles for a mature research programme, namely: 'positive heuristics'; novel facts; 'empirically progressive'; and 'dramatic confirming instances'?<sup>14 47</sup>

Did the similarity solve problems? The following unbiased critical non-homoeopathic peers of Hahnemann, Dr Hufeland, Professor Eschenmayer, and Dr Johann Kopp, concluded, among others, that the similarity and provings provide for exact testing and knowledge of drugs, remove the uncertainty of drug action, and allow for the individualisation of patients' cases.<sup>4</sup>

The individualising nature of HTS is illustrated as follows: Arsenicum Album: asthma due to laughing and physical exertion; Ferrum Aceticum: asthma after lying down, in a patient having on exertion, redness of the face, and asthmatic coughing; Syphilinum: severe asthma during hot and humid weather.<sup>104</sup> Thus, if Ferrum Aceticum is administered to a patient needing Arsenicum Album, the patient will not respond successfully—likewise for any of the other therapies. The correct drug must match the patient's disease accurately, akin to a pin number or pass word—when incorrect, failure ensues. In contrast, medicine treats asthma patients via protocols; standardised treatment for all patients.

Modern assessments of the similarity have been performed by a number of authors.<sup>1 3 70</sup> Bellavite et al said that the "'similarity' withstands the test of time", and 'has been supported by scientific findings'.<sup>1</sup>

Lakatos' other requirements are the provision of 'novel facts' and being 'empirically progressive'. Dr Kopp confirms novel facts such as 'the effects of medicines on the disposition, the temperature of the body, the sleep, with regard to thirst, &c., [which] bear witness to the fertility of his genius and to his power of discovering new and true points of view in the realm of nature.'<sup>4</sup>

Lakatos' final requirement is dramatic confirming instances which are confirmed by the 'the distinct superiority of homeopathy in treating' the epidemics of the 1800s.<sup>1 3 4</sup> The effectiveness of HTS were confirmed by the United States Congress,<sup>3</sup> the French government,<sup>3</sup> and the British Parliament,<sup>4</sup> during the 1800s.

### Testing/Evaluation of Technologies

A 'type 4', TRL 7 test, was the employment by Dr Hahnemann of, e.g., Arnica for giddiness.<sup>29</sup> A further example is Dr Rau, who about 1824, was known to have 'tested

[homoeopathy] for twelve years before defending it publicly'.<sup>3</sup>

**Scientific Evidence of HTS**

In order to confirm the scientific evidence of HTS, all the information analysed thus far is drawn on, in addition to the development and verification of the Airbus A380 aircraft. This will allow for the verification that 'a right and good healing action taken in the interests of a particular patient',<sup>28</sup> one patient's outcomes, represent the scientific evidence of the therapy and its principles, which is not 'utterly unscientific'.<sup>9</sup>

Figure 3 depicts the development and verification of the Airbus A380 aircraft, and the clinical outcomes of one patient. The patient was involved in a high velocity head-on motor vehicle accident, in which his brother died, while his wife sustained multiple fractures. The patient suffered a fracture dislocation of his L2-3 vertebrae which caused an American Spinal Injury Association Impairment Scale B (ASIA B)<sup>105</sup> spinal cord injury (SCI); Figure 4. An ASIA B SCI patient's recovery is 'fairly limited and predictable'.<sup>106</sup> But, recovery of 'two segments below the most caudal

segment of the [zone of partial preservation] ZPP rarely occurs.<sup>106</sup> Hypericum 1M dissolved in water, three times daily, could only be administered three weeks after the injury on 05/01/2000. One week later, on 12/01/2000, a doctor noted that his 'Toes are now moving bilat!!' He thus recovered power from L2 to L5 within one week. Figure 5 confirms that he walked with a frame by 03/02/2000, and was fully functional by 02/03/2000, 8 weeks after commencing Hypericum. His outcomes are dramatically better than the known outcomes for motor-complete ASIA B SCI patients.<sup>106</sup> Professor Glasziou from Oxford University, UK, deemed his case 'interesting' but requested 100 more similar cases. However, are the outcomes of this single patient, or any single patient for that matter, the scientific evidence of the therapy according to 'medicine qua medicine'? The following analysis aims to verify it.

Please view the A380 programme<sup>26</sup> especially the photograph on page 4. Five aircraft are depicted, with their respective dates of delivery, and first test flight.<sup>26</sup> Each aircraft is assembled from its many components after their respective testing, and demonstrations.<sup>63 64 65</sup> One aircraft, MSN 001, was designated for the A380's first test flight on

	Airbus	Homoeopathy
<b>Performance Requirements</b>	<ul style="list-style-type: none"> <li>• Aircraft components</li> <li>• Airbus A 380 aircraft</li> </ul>	<ul style="list-style-type: none"> <li>• Exact therapeutic powers +</li> <li>• Matched patient's diagnosis</li> </ul>
<b>Outcomes Verifications</b>	<ul style="list-style-type: none"> <li>• <b>Component Verification</b> Fan blade containment test</li> <li>• <b>Aircraft Verification</b> A 380-841: MSN 001 27 April 2005 <b>One Aircraft Flight Tested!</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Certain Therapeutic Outcome</b></li> <li>• <b>Hypericum for SCI</b> <b>One Patient Required</b></li> </ul>



**Figure 3. Homoeopathy vs. Technology Verification. Airbus A380 vs. Hypericum.**







NASA's TRLs			
Least Mature Technology	Experimental Technology	Maturing Technology	Mature Technology Scientific Evidence. Marketing.
TRL 1-2	TRL 2-3	TRL 4-7	TRL 8-9
Homoeopathic Therapeutics' Scientific Evidence			
Trituration Potentisation	Provings	Arnica For Giddiness	Cholera, 'Anecdotes'. Scientific Evidence.
TRL 1-2 Pass	TRL 2-3 Pass	TRL 4-7 Pass	TRL 8-9 Pass
Medicine's Scientific Evidence – FDA			
Drug Developed Testing in Animals Review by Boards	Phase 1 Trials Phase 2 Trials Phase 3 Trials Drug Licensed for Marketing	No Testing, Verification Before Marketing.	No Demonstrations Before Marketing. Post-Marketing Surveillance.
TRL 1-2 Pass	TRL 2-3 Pass	TRL 4-7 Fail	TRL 8-9 Fail

Figure 6. NASA's TRLs vs. Homoeopathic Therapeutics vs. FDA.

Force.<sup>76</sup>

In the realm of medicine, the 'act of [the] medical profession is inauthentic and a lie unless it fulfills the expectation of technical competence' and the 'physician acts as physician only when he particularises the conclusions about what is wrong and ought to be, must be, may be, or should not be done for this patient, here and now'.<sup>28</sup> Worthy clinical demonstrations in the medical profession can thus best be obtained by clinicians with exemplary SCIDOCK.<sup>109</sup>

Competency, especially exemplary performance<sup>76</sup>, requires a mature product which must be used professionally, and appropriately. Therefore, a commissioned submarine cannot, should not, and ought not, be driven up-side down, in reverse, on dry land.<sup>22 23 24 59 60</sup>

**Discussion**

Are the 'efficacy-effectiveness paradox', the arguments against HTS, and the rejection of its clinical successes, valid when scrutinised by the sciences of Newton and Einstein, and the products fashioned subject to them?<sup>25 67 8 9</sup> This conceptual analysis drew on a comprehensive array of disciplines and institutions from the sciences, and Technoscience, to assess HTS critically. Of utmost importance, the analysis of HTS was kept within the realm of the aims of the profession of medicine.

The benchmark institutions require that a theory solves problems, provide for novel and accumulating facts, and must be verified in real-life.<sup>14 47</sup> The theory and methodology to produce a mature high quality product must be present from the very outset, otherwise the product will fail.<sup>24</sup> Nevertheless, high quality and powerful products allowed modern man to accept science.<sup>20</sup>

The following summarises Technoscience:

TRL 1-3: Science and experimentation answer the question, "Can it work?" on the basis of the scientific principles. Such technologies provide unverified experimental evidence.<sup>21 22 24 25 53</sup>

TRL 4-7: Testing/verification answers the question, "How well does it work in practice?" under increasingly realistic environments, while eliminating uncertainties and risks. When unknown problems surface, scientists revert to TRL 1 – 3 to resolve them, following which testing is conducted once more.<sup>21 22 24 25 53</sup>

TRL 8-9: A demonstration means that an 'exemplary' user has accomplished with the technology that which the technology must achieve under its uncontrolled operational conditions. This is the scientific evidence of the technology.<sup>21 22 24 25 53</sup> Experimentation on a mature uncontroversial product is inept technologically. Mature products must only be demonstrated by an exemplary user.<sup>22 23 24 59 60 76</sup>

The principles of the benchmark institutions thus deem that the scientific evidence of a medical therapy, which can only be attained by a mature therapeutic product employed by a competent clinician,<sup>77</sup> is represented by its worthy and successful results where the therapy achieved what it must achieve for the 'particular patient' based on knowledge and not 'fortuitously'.<sup>22 23 24 28 59 60 66</sup> This defines medical therapeutic 'success'<sup>67</sup> correctly—philosophically, scientifically, and technologically.

The analysis concludes regarding medicine the following:

TRL 1-3: Science, and experimentation (efficacy) 'Can it work?' trials, is devoid of a theory and methodology for individualised therapeutics, and therapeutic certainty, from the outset.<sup>33 90</sup> The patient's disease is delinked from therapeutic knowledge, resulting in therapeutic uncertainty—the patient's input is unknown, thus the output is thus unattainable.<sup>90 91 95</sup> Due to therapeutic uncertainty from the outset, medicine adheres rigorously to controlled and statistical methods to eke out the 'marginal' effects of therapeutics acting on common phenomena.<sup>110</sup> However, controlled methods cannot control the uncontrollable biological variability<sup>73 91 111</sup> of trial patients as 'human beings are unaverageable'.<sup>112</sup> In consequence, homogeneity of trial subjects is impossible.<sup>73 91 95 112 113 114</sup> As such, the trial world

and the real world have nothing in common.<sup>95 115</sup> Individualisation, via extrapolation from population studies, is therefore impossible.<sup>90 91</sup> Its therapies hence procure an effect for the individual fortuitously.<sup>33 97 91 95</sup> Experimental efficacy is erroneously legitimated, instead of 'true test' evidence and demonstrations of individualised therapeutics of the individual patient,<sup>33 94</sup> in contradiction to the benchmark institutions. Medicine thus fails 'medicine qua medicine'.<sup>28 66</sup> Ultimately, an experimental therapy is marketed without confirmation of its true capability.<sup>33 116</sup> Examples are: Mibefradil,<sup>117</sup> Rezulin,<sup>118</sup> and Baycol.<sup>119</sup>

TRL 4-7: Testing/verification must be effectiveness studies, performed as 'true' tests, in clinical practice.<sup>94</sup> The absence individualised therapeutics renders testing in clinical practice meaningless for the individual patient. Testing is also not legally required, and performed, before marketing.<sup>33</sup> It is equivalent to Rolls-Royce plc not performing the legally required fan-blade containment test.<sup>63</sup>

TRL 8-9: A demonstration denotes that an 'exemplary' clinician accomplished with a therapy that which the therapy should do for the individual patient.<sup>28 66</sup> This represents the scientific evidence of a therapy<sup>28 66</sup>, which is not procured prior to marketing.<sup>33</sup> However, this evidence is erroneously dismissed as 'anecdotal'.

In conclusion, medicine's principles are unworthy as benchmark for individualised therapeutic development and verification.

Homoeopathic therapeutics is valid philosophical, scientifically, and technologically, since the similarity and provings provide individualised therapeutics,<sup>2 3 4 29</sup> and achieves 'medicine qua medicine'.<sup>28 66</sup> The similarity and provings inimitably unify diagnosis, therapy, and outcome.<sup>2 3 4 29</sup> Dismissing the exemplary effective homoeopathic therapies due to the incompatibility of its theory and its as yet unknown science is historically, scientifically and technologically erroneous,<sup>67 68</sup> but it's still politically legitimated.<sup>14 16 94</sup> In fact, Professor Sir Michael Rawlins says that the National Institute of Clinical Excellence do not mind 'whether [they] understand how a treatment works or not'.<sup>120</sup>

The analysis concludes on HTS the following:

TRL 1-3: This is represented by the similarity, and provings on the healthy, after drug acquisition and preparation.<sup>1 3 4 29 103</sup>

TRL 4-7: A 'type 4', TRL 7 test, was the employment of, e.g., Arnica for giddiness.<sup>29</sup> Camphor, Arsenicum Album, and Mercurius, e.g., were employed for Cholera.<sup>2 3 4</sup> They represent 'true' tests of the therapies,<sup>21 22 25</sup> similar to, e.g., the fan-blade containment tests,<sup>63</sup> and test flights.<sup>26</sup>

TRL 8-9: The 'distinct superiority' of HTS in the Cholera and Yellow Fever epidemics denotes demonstrations; the spinal cord patient's case too. This is its scientific evidence, achieved via mature TRL 9 therapies.<sup>2 2 3 4</sup> A TRL 3 experimentation on a TRL 9 HTS is technologically erroneous—they must only be demonstrated by clinicians with exemplary SCI-DOCK, and not by inexperienced, pedantic or

biased users.<sup>28 53 66</sup>

Demonstrations, as effectiveness studies, require outcomes research methodologies in the therapies' operational environment, which are never ever controlled.<sup>94 100 101</sup> Bellavite et al claim that 'there is [a] paucity of controlled studies concerning their effectiveness'.<sup>121</sup> Controlled conditions elicit efficacy in the laboratory environment.<sup>22 23 24 25 53</sup> An aircraft is flown outside the laboratory—its uncontrolled environment to verify it does what it must do. Insisting on experimentation mires HTS in 'experimenter's regress' which causes the 'efficacy-effectiveness paradox',<sup>5</sup> which this analysis solved via the benchmark institutions' principles.

Boon et al discuss four research systems for the assessment of CAM.<sup>122</sup> Of the three systems, only Phases 1-2 of the Nasjonalt Forskningscenter innen Komplementaer og Alternativ Medisin (NAFKAM) is logical, as depicted in Table 2<sup>123</sup> of their article. Phases 3-5 are erroneous; mature uncontroversial products are not experimented on, even via a pragmatic RCT.

Furthermore, whether in research, or in clinical practice, clinical failures have been attributed to mistakes made in the 'complexity of its diagnostic procedure'<sup>1</sup> as well as the therapeutic methodology and management. Perhaps the most influential discussion on this subject is contained in Chapter 9 of the book, *Commentary on Organon of Medicine Sixth Edition*, by Robin Murphy ND.<sup>124</sup>

HTS are seldom employed officially internationally. It is therefore possible that the essence of this article may provide the philosophical, scientific, and technological basis to address many Governments and International Institutions such as the World Health Organisation on the validity and worthiness of the employment of HTS in institutions of health

In conclusion, this article can hopefully provide the basis for further research to expand on the concepts expounded in it.

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