Polity by Design;
an engineering approach

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Rules by which societies govern themselves are called institutions. Institutions can be political, economic, social, but generally they are a complex combination of these. Universities and Academies of higher education include a course or paper titled 'Political Engineering': as reflected in the title, some kind of so-called engineering is applied to political science. The phrase 'so-called' has been used with intent and some disgrace is associated with it. This paper, while justifying these adjectives, is categorically the first bold attempt to apply genuine engineering practice to political science.

1 Basics

1.1 Two types of problems. in engineering

All problems in engineering can be classified in two distinct types: those pertaining to performance analysis and those pertaining to design synthesis. Solution to the former kind lies in analyzing the behavior of products or systems that have been already synthesized (whether systematically or not). Since the existing world has plenty to offer, worksheets composed of these exercises form a major part of curriculum in engineering departments. Formally qualified engineers using standard texts and handbooks successfully achieve good grades in such examinations. Problems of design synthesis are critically distinct from their analytical counterparts. This dividing line is more severe and strict in some disciplines than in others. Where it is not severe, reverse engineering has a higher success rate. Heat transfer, vibrations, structures and process engineering fall in this easy-to-invert category. While designing in cases pertaining to these branches, the failure of our first trial to meet the specifications tells us which way to move to vary the parameters. Most likely, we optimize accurately, converging systematically and predictably, even though through the use of linear approximations, on to a final, best design. Mechanism synthesis falls in the other, difficult-to-invert group. It is easy to start from scratch and design a 'nearly required' mechanism; till this closeness, some reversal of theory of mechanisms as taught in the classes is useful and even usable. Fine tuning is achieved by inventiveness, intuition, creativity and elegance on the part of the designer .This explains why the eccentric inventor, cut-and-try draughtsman, back-room model builder, mechanno-player, ingenious mechanism assembler often enters the hall of fame, at least in the domain of mechanical science! To summarize then, tools, techniques and

most importantly the attitudes of mind required to tackle the two different kinds of problems in engineering are clearly alike.

1.2 So-called political engineered institutions vs. the engineering designed physical world

Till date, the so-called Political Engineering as taught and done, uses tools of economic theory, game theory, social-choice theory and formal logic to both understand (analyze) and create (synthesize) institutions. The choice of word 'engineering' is a misnomer as the word is used very loosely, almost to the extent of disrespect for it. Still, institutions designed by using this loose engineering meet certain technical 'specifications' and are therefore undoubtedly superior to their haphazardly evolved cousins. Still, some experiments using political engineering notably failed; an example was the Greek political junta of 1967-74 in which a coup was employed to modify the Greek political landscape .The result was catastrophic. Just like genuine industrial design engineering when applied to medical technology translates an advanced momentum exchange theory to manufacture a regenerative flow-type blood pump, (pseudo) political-social-economic engineering translates its rational-choice-analysis (probably with some inbuilt equal opportunity axiom) into an Internet-enabled stepped-fashion Auctions (a modern bargaining and arbitration Procedure). This paper deals with the application of genuine engineering design methodologies to political institutions; it should be termed as 'honest political engineering'.

1.3 Polity by design ; honest political engineering

Political Science, if considered as one of the disciplines of engineering science, belongs to a slightly difficult-to-invert category; problems in political design stand mid-way between those of thermal engineering and mechanism science. This paper is demonstrates the success of one such design exercise in which the end product is good governance of a nation or a territory.

1.4 Two tracks in design : evolutionary and (r)evolutionary

All humanly designed physical products, systems and processes are either a result of discrete iterative stages or a sudden surprising step. The former track is evolutionary; the product's structure and functionality can be tracked through the passage of time. Sometimes an innovative, refreshingly novel design is carried out: we say that the ingenious designer has advanced a revolutionary milestone. Generally a design moves through history via alternation through evolutionary and revolutionary phases. About naturally designed products, of which man is a biological example, nothing can be concluded for sure. Darwin's followers would surely vote for evolution, but then it can be proven otherwise. May be Nature follows a third track, unknown to us?

2 By default, by so-called political engineering and by genuine engineering design methodologies

Sir George Bernard Shaw put it 'Politics is the last resort of the scoundrels'. Perhaps he had seen present, read past and foreseen future to conclude this remark; today politicizing is a synonym for unethical code of conduct in organizations and baser instincts of humans. The pages of history are loaded with illustrious politicians turned leaders. They were often educated (many of them being Oxbridge dons or Harvard graduates), not so selfish, patriotically inclined, intellectually unbiased, and even sacrificial: yet politics remains a chaotic, corrupt and most dangerously a manipulative sphere. Let us in retrospect examine the emergence and progression of political institutions. The establishment of a humble Mohammed Anglo-Oriental College (1875) and its final conversion to a grand Aligarh Muslim University (1920) by Sir Syed Ahmad Khan during British India period are apparently analogous to an evolutionary design process in the physical world (like the teapot design over ages). The quicker French Revolution (1789-99) by name sounds akin to a revolutionary design in the man-made world (Like the wheel. The geometrical figure of circle couldn't have evolved from its near-ellipse or a several-faced polygon, the idea of circular rolling must have been abrupt, inventive and applauded.) Both these political institutions appear to be the output of the before mentioned so-called or fake political engineering, and that too when it was in its primitive phases. Normal political amendments to the Constitution and the Veto-power clause in the Security Council of UN are end-products of consciously applied political engineering (again so-called engineering) in its sophisticated format. The former is akin to an evolutionary design while the latter resembles a revolutionary design.

The physical world abounds in both good and bad designs. Of course, all are a consequence of genuine engineering. Sadly products that form a part of basic lifestyle and living are worst created. Neither is money invested, nor is talent retained and excited to improve these. Spoon, in cutlery since stone ages probably has hardly bettered. It spills with little carefree attitude, often spoils dresses and smears lips. Probably table manners are courtesy these poorly designed kitchenware and of course cultural sophistication. As a result, we are yet to invent and manufacture a spoon that can collect food of a wide range of properties (from watery jelly to hard frozen butter) with minimum muscular effort, can be carried to the mouth with a random trajectory, and can finally empty the complete load in the middle portion of the mouth without discomfort and spoiling the lips or moustache. So next time you see expensive glittery dining, think of this side. As they say, all that glitters is not gold! Carefully designed products can be recognized wherein the consequences of failure is either a human loss or a massive monetary debt; airline operators are aware and hence to avoid filing bankruptcy opt for efficiently designed aircraft from reputed manufacturers who in turn keep cost-saving factors below factor of safety while designing machines. Keeping note of the technological limitations, these cutting-edge flying machines probably are 80% good, on a design scale, if there exists one. Its absence itself shows how unconcerned the technological community is towards goodness factor in design.

Turning towards institutions generated by so-called political engineering, the following is observed: majority of them are bad or misfit. An example of a poor design in the global context was the 2nd World War; its side effects were massive losses and an unpredictable world order emerging by default processes. It appears that genuine engineering design, whether of evolutionary or of revolutionary nature, gives result to both good and bad designs in the physical world. Sadly, the bad designs are in majority. However, political institutions, whether a result of so-called political engineering or default civilization growth are invariably remindful of bad designs! We wait when polity is designed by engineering, actual and not so-called.

3 Taking help from parallel designing: an example

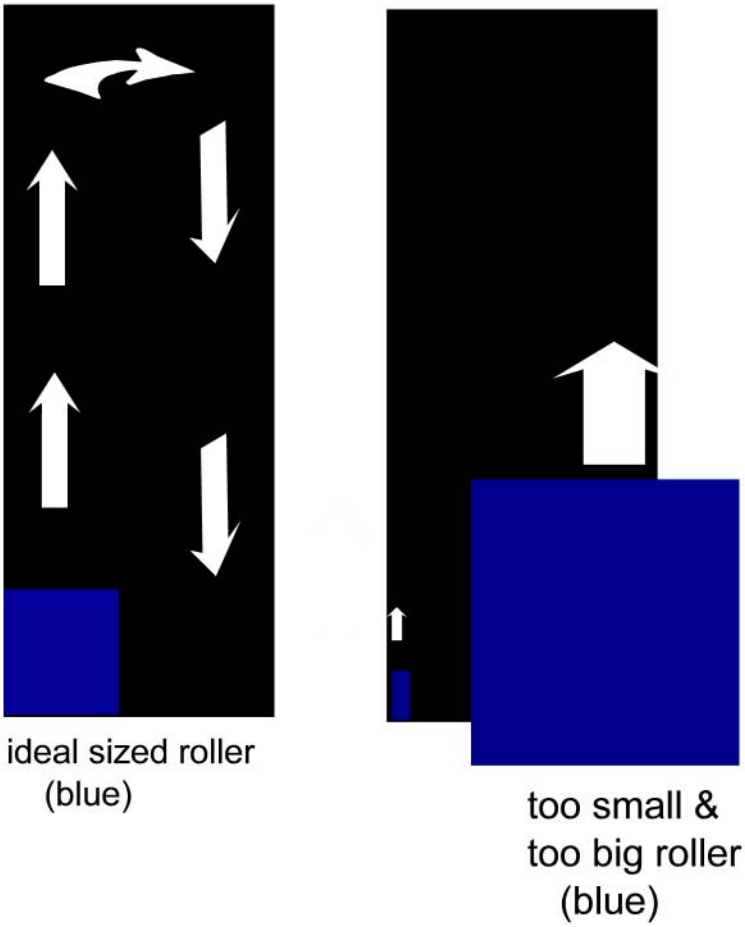
I present a singular analogy between the physical world of technologists and the ruled society in democracy: Sizing the ideal area of a road-roller for resurfacing a highway of a given area vs. sizing the House of Commons (number of governors) to democratically rule the given size of British population.

1) Let us design the optimum size of a road roller or other machinery to resurface a road1km (1000 meters) long and 100 meters wide and hence 100,000 sq. in area.

2) Engineering design *can*, without knowledge of the product details of the road and machine, calculate the following ratio. Area of machine: Area of road. Let this ratio be 'N'. We have approached the problem as a black body one, importing words from physics; black suggests no information available except dimensions. The design process has worked out this ratio 'N'. Common sense suggests that 'N' cannot be '1' or 'more than 1'; the roller cannot be as big as road or leave alone larger! Some proportion can be thought off even through common sense. On the other extreme, "N" cannot be '0.00000001'; a fly sized roller would take years to make road, no matter how fast it works!

3) Taking analogy to democratic governance, let us work out the following ratio. Number of elected representatives in House of Commons: the population to be governed. This ratio obviously 'smaller than 1' is or probably was decided by parliamentarians and policy makers, and not by engineers like me. As population increases, the elected body expands to maintain this constant ratio, which is rarely altered by veto-type amendments.

4) If this problem is given to engineering designers, the ratio would be calculated more rationally. Of course literacy, per capita income would be parameters that would be accounted for. But this ratio would be more efficient, saving (or utilizing) human & natural resources to the best.

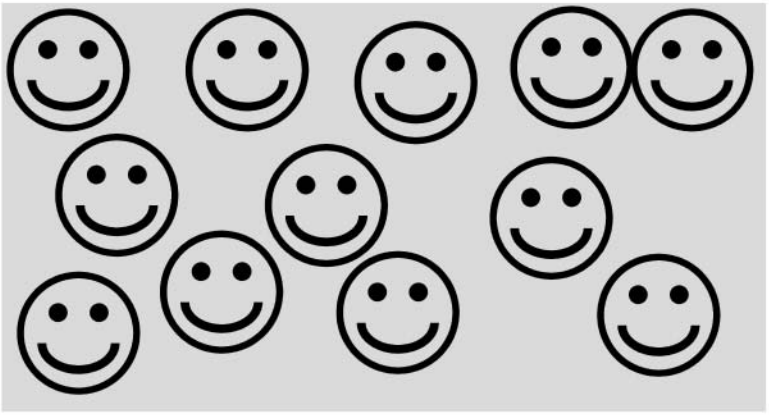


ideal sizing of road roller to resurface a given road

number of elected representatives

roller size

number of people, viz. voting population



road size

4 An online program: political machinery

In one of its module, strength of the ruling assembly (the governing number) would be computed using parallel principles of conceptual design in engineering. Two kinds of inputs would be there: Firstly, the statistics of previous successes and/or failure of earlier governments and their distinct characteristics would be fed in. Secondly, a multitude of parameters (of which just few are listed below) would be requested:

a) Kind of governance : Democracy/ Monarch/Military Regime /Colonial Suppression/etc.

b) Population to be governed: less than 10,000/ between 10 to 100,000/ more than 100,000

c) Per Capita Income (in US $)

d) GDP of the state

e) Kind of economy: developed/ developing fast / uncertain or slow developing/ undeveloped

f) Corruption level in percentage

g) Environmental attitude (this includes climatic, weather conditions- whether harsh or favorable averaged till the next election): very conducive / just conducive /etc.

The alternative analysis-synthesis approach, as is done in reverse engineering, would be done by Political Machinery; number of Members of Parliament required would be the numeric output! Perhaps the coiner of the term, Political Machinery was a machine designer!

state : republic of wisdom
kind of governance: direct democracy
GDP : US $ 2330 Billion
Population : 34,779,48
Climate : Favorable 80%, Unfavorable 20%
Infrastructure : Completed 97%
Corruption : Very low, 3-4%
Literacy : 98%

Levels of governance : 2, national & state
Discrimination : Almost Zero

Notes: Past record of success in governance (over last 30 years) is NA (nation born 2005), 1st Congress Elections to be held 2008.

Processing.....

Number of Representatives needed: 1/100000 th of population
= 34.77 (to be rounded to 35)

5 Bibliography

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