

# Nutrition Driven Food Processing

## – *More from Less for More*

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**Awareness of Dietary Guidelines may promote Healthy Lifestyle both in Rural and Urban areas. Information Reach out has to be Revolutionary at the Rural, and Semi Urban and Urban levels and even to Lowest Economic Strata through Multimedia approach and Women empowerment for better health through Sustained Nutrition Life Long on Food based approach through *appropriate***

**FS&T**

The Crux of the matter is  
to **link** the

**Informal** Food Processing Centres

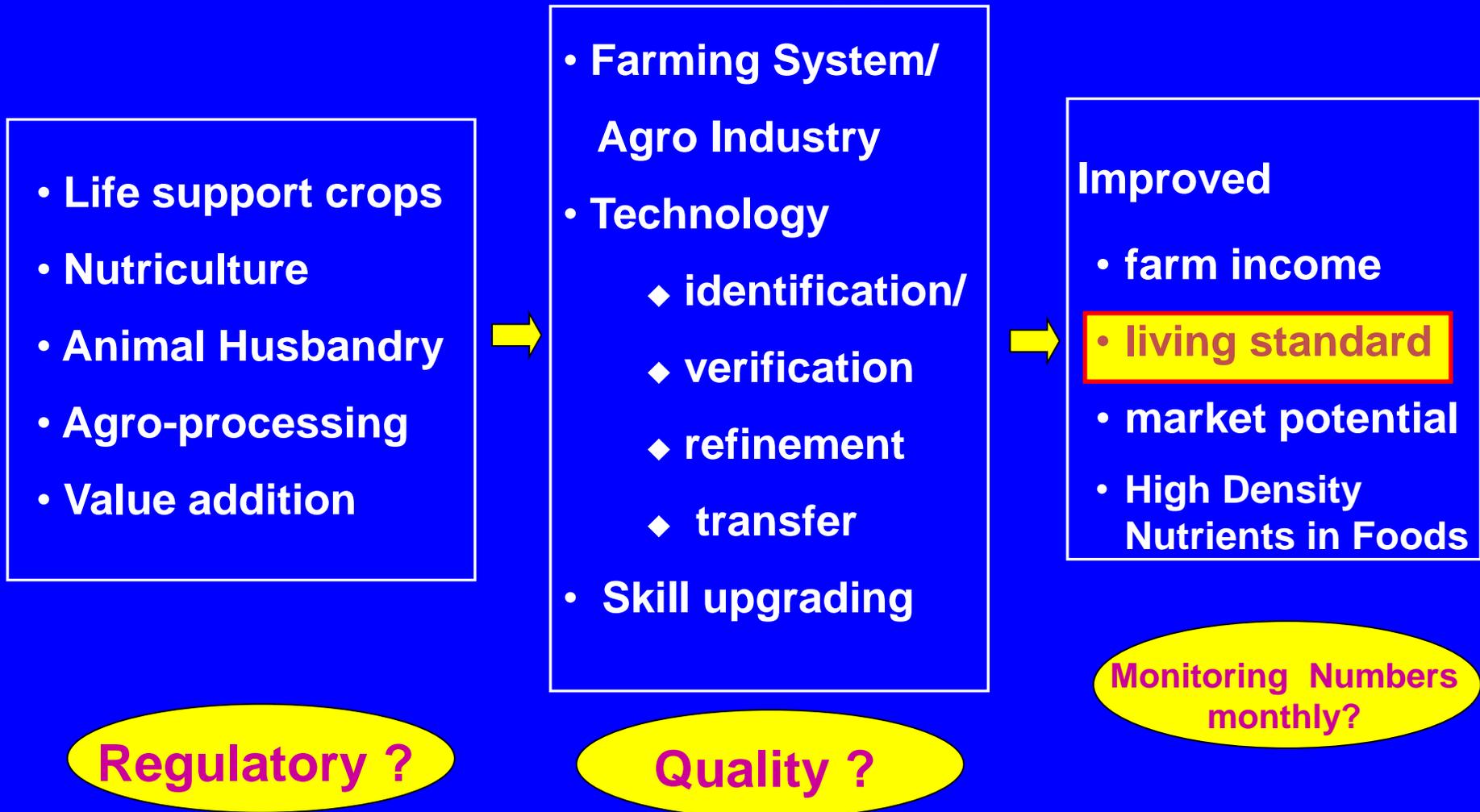
to

**Organised** Food Processing Centres

*with* involvement of growers and

**Manufacturers with a Focus of Value Addition to  
Agrimaterial** retaining Nutrients to the maximum  
extent and affordability with adaptable  
technologies for better health through Sustained  
Nutrition Life Long on FS&T based approach.

# Flow - chain for enhancing Value In the FS&T-Nutri Sector in The Life Span for better health through Sustained Nutrition on FS&T based approach





Food losses and waste in the context  
of sustainable food systems

A report by

The High Level Panel of Experts

on Food Security and Nutrition

June 2014



**by**  
**Dr V Prakash**  
**Project Team leader**

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# **TIME TO CHANGE !**

To use **available** scientific knowledge to  
improve

**food safety**

and

**food (nutrient) security**

**Globally**

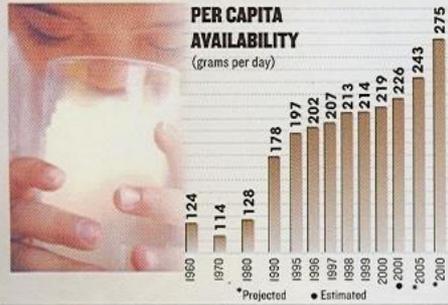
with a Sustainable Approach

**Diabetes, heart disease and other  
Non Communicable Diseases  
(NCD's) are rapidly emerging as  
the major cause of deaths in  
most of the *Obesing Economies* !  
Is it right that FS&T and Food  
Industries be blamed for this  
Syndrome ??**

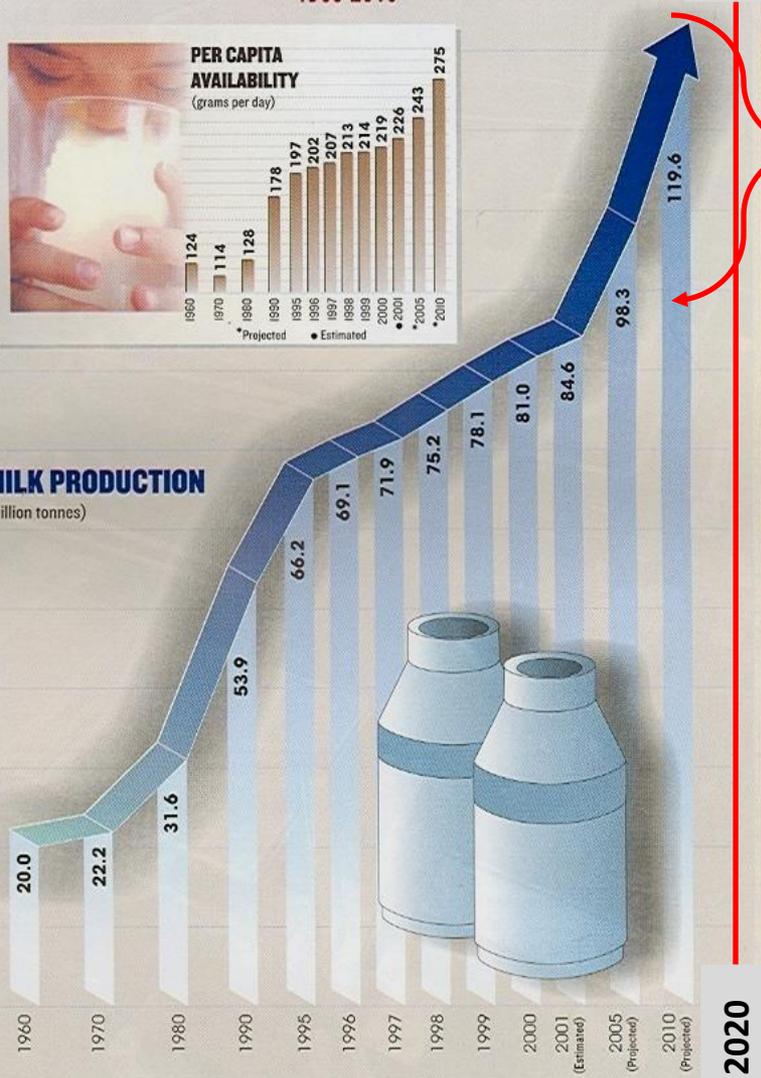
**Thus, there is an urgent Need for Value addition to Raw materials on the model of FS&T-Nutri Science & Business based Integrated approaches. It is a must that should happen swiftly. Primary and Secondary Processing for retaining Nutrients with Sustainability and Fortification for better health is the need of the hour.**

# MILK PRODUCTION AND AVAILABILITY

1960-2010



## MILK PRODUCTION (million tonnes)



Value addition is the key for induced milk production

**So, if the Nutritionist  
went to the kitchen at  
home and Community  
cooking perhaps a  
deeper sustainable  
change may happen ?!**

**Similarly,**

**Transactional Leadership  
using Food-Nutrition for  
better health through**

**Sustained Nutrition Life Long  
on FS&T based approach  
needs Integrated approach.**

# **Capacity Development in FS&T-Nutrition**

**is**

**a Strategic agenda currently. Planning  
the Professional requirements for next  
1000 days and Trained HR and getting  
the numbers ready in the Country and  
Region is urgently needed.**

**Transformational Leadership and  
Youth Leadership in FS&T-  
Nutrition Reach out to be  
encouraged through Right  
compensation and setting the  
targets stagewise and ensuring it  
is achieved by STRICT  
Monitoring and Executive and  
Financial Powers down the line.**

# **Fighting Hunger with Better Nutrition**

**must be addressed with passion along  
with and just not compassion slogans  
alone !**

**Without this, better health through  
Sustained Nutrition Life Long on FS&T  
based approach is not **achievable.****

**Importance of**

**Micronutrients in Daily Diets is**

**the Need of Hour and is not**

**like couple of doses of**

**vaccination in one's life time !**

**It is a daily requirement on a**

**Sustainable basis.**

# **Translational Science and Technology involving FS&T and NUTRITION Sciences.**

**This is a multidisciplinary endeavor involving nutritional science, food science and health sciences, all underpinned by basic life sciences and requiring clear communication and with guaranteed implementation of course with constant monitoring of numbers and Macro targets with mid course corrections if any ?**

# ***FS&T & NUTRIgenomics: A matured Scientific Discipline***

## **LONG TERM BASIC & STRATEGIC RESEARCH**

***A Treasure in the pipeline  
for***

***Nutrition understanding and  
Implementation.***

***The Role and Power of CHEMISTRY in  
Sustainable Nutrition Life long is missed !***

**POWER OF CHEMISTRY,  
BIOTECHNOLOGY WITH  
FS&T and NUTRIGENOMICS**

**Nutritionists and Chemistry  
have to come more closer !**

# Where is the chemistry?

Proposals for doctoral training centres lack one important element, says David Parker: some science

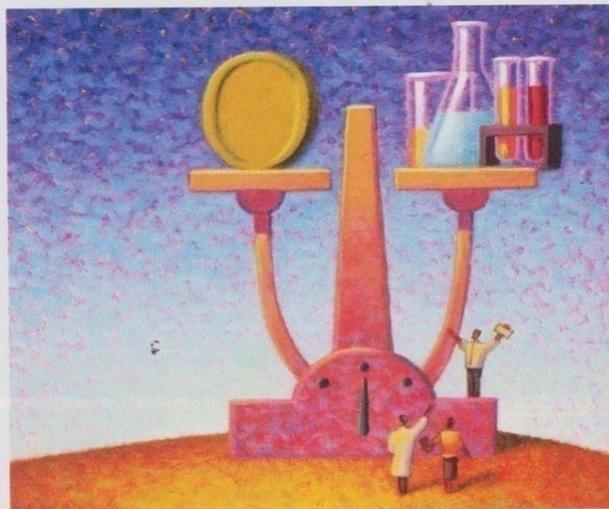
In November 2013, the Engineering and Physical Sciences Research Council (EPSRC) announced £350 million to support and grow its centres for doctoral training (CDTs). The announcement was welcomed, as funding announcements usually are; most scientists will say that they should be supported more in their work. But we should be concerned, because this support is being granted without clearly assessing the science that is to be conducted.

In my view, we have not been particularly good at deciding how to distribute funding in the UK. Here, in the Anglo-Saxon cradle of learning, my senior colleague Jim Feast did not gain Science and Engineering Research Council (SERC; precursor of the EPSRC) grant support for his first 20 years and his colleague Dick Chambers built an understanding of fluorine chemistry primarily based on industrial support and US Air Force grants. In Sussex, Harry Kroto did not get much grant money from SERC before his moment of enlightenment, and then it took a decade before it dawned on others that this would lead to new areas of science.

Today, as we allocate very large sums of money to the CDTs, we should examine the decisions behind this funding carefully and ask whether this process of PhD support stands up to scrutiny.

## Alas, a lack

The science that evolves in PhD research is the lifeblood of our university chemistry departments. We must safeguard it and encourage fundamental new work focused by challenging objectives. If we are committing millions of pounds to support doctoral students in putative centres of excellence, we should check that they are setting out to address excellent new science.



This work should be characterised by its rigour, significance and originality. 'Impact' may arise, but is not predictable of course, and is a much less important criterion for assessment in this case.

Yet the final cases for assessment of CDTs contain no science to speak of at all. Let me make this clear: no new science appears in the cases for support; we cannot blame the applicants, because it is simply not requested. They place an emphasis on training and transferable skills, getting the students to learn about ethics and intellectual property; much of this material is to be found in undergraduate or masters courses. Perhaps this extensive system of postgraduate training is more appropriate for our future research technical staff in industry and academia?

## Followers of fashion

Excellence in PhD research arises from a combination of preparation, rigour, patience,

## 'Too often, we pass the PhD student but want to fail the supervisor'

ability and inspiration from both the student and, just as importantly, their supervisor. When you ask a PhD chemist about their degree, they will tell you first with whom they studied, not which class or grouping or even at which institution. Thus, the quality of the people who will act as supervisors should be assessed, examining their output record as a function of input. Too often we are asked to examine PhD theses based on half-baked or ill-conceived ideas, where we pass the student, but really want to fail the supervisor. We need a mechanism that weeds out such projects before they begin.

Unfortunately, the final cases for assessment of CDTs do not ring with new projects and contain little detail about the

allocation of supervisors (often just long lists). I suggest that we think hard before putting yet more cash in support of these centres. Examine the outcomes carefully: how many PhDs led to this work or output? Calibrate achievement against input and compare to other support methods. Such thinking should be applied more widely; we still seem to adhere to the 1980s ethos of supporting bandwagon research themes, where much low quality work was screened by ill-informed hyperbole, on topics defined by self-interested groups or extolled by persuasive individuals.

Until 2012, peer review of new science projects for PhD support was possible, and where appropriate these were validated or supported by co-sponsorship with industry. In addition, there was the opportunity to bid for competitively selected awards for partnerships with industry, whereas now many of these are in the hands of larger companies who select projects based on their short term needs. Should we not consolidate the current award system and define its remit more precisely, giving it edge and competitiveness?

Let us build our doctoral cohorts on the solid ground of achievement and ability, by identifying imaginative, diligent and energetic supervisors and students (and setting a cap on the number of PhDs any one person can supervise – students need time for 'hands-on' supervision). We should nurture those who seek understanding and not simply pay lip-service to short-term themes, based on shifting sands of shallow significance that change quickly, erode and oft are soon forgotten.

*David Parker is a professor of chemistry at Durham University, UK*

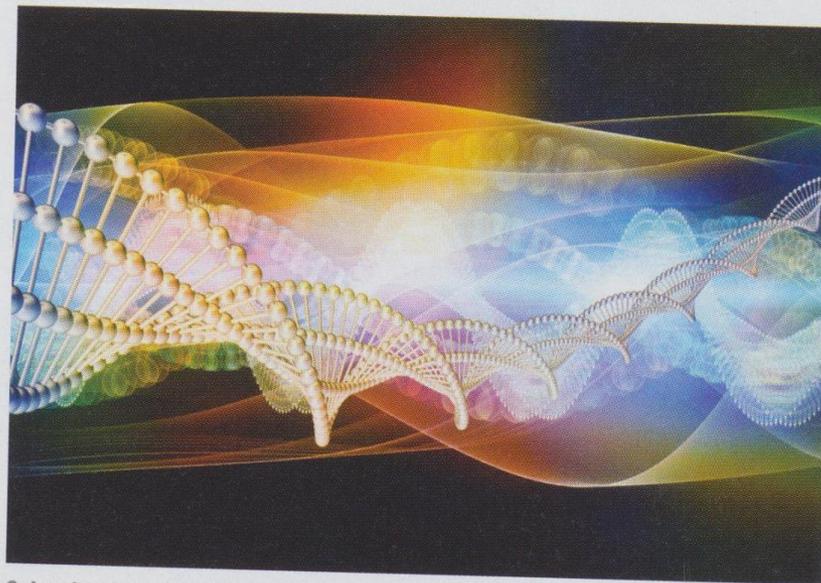
# Cell Building

## A cytochrome from scratch

Man-made protein fits into natural pathways

Artificial proteins could be closer to participating in natural biochemical pathways after UK and US researchers show that bacteria will process amino acid sequences entirely unrelated to any natural protein to produce a fully functioning cytochrome. The burgeoning field of synthetic biology demands that functional artificial proteins and enzymes seamlessly integrate with natural proteins and substrates. 'We're trying to build artificial proteins that exhibit some of the properties and chemistries of natural proteins,' explains team member Ross Anderson from the University of Bristol.

Anderson and colleagues have used a relatively new methodology called the maquette approach that lets them escape some of the complexities of natural systems to construct



Scientists trick *E. coli* into producing their artificial proteins

their artificial cytochrome. They begin with a generic protein sequence designed only to fold into a four-helix bundle. Engineered elements are added onto the stripped-down protein chassis; the role of every residue in the amino acid sequence is defined and adjusted by altering critical residues.

Even though the protein

sequence designed by the team does not appear in nature, the post-translational machinery of *Escherichia coli* will process the sequence to build the synthetic haeme C cytochrome. The synthetic cytochrome was designed to have a displaceable histidine haeme ligand that can be involved in oxygen binding. This functionality opens the door

to processes ranging from oxygen storage and transport to catalytic hydroxylation being incorporated into artificial proteins.

'The construction of de novo generated helical bundle protein assemblies has attracted much interest but the area has lacked the "killer punch" in terms of useful functionality combined with recombinant production and post-translational modification, a process that nature does so well,' comments Dafydd Jones, a protein engineering expert at the University of Cardiff, UK. Jones says this study has successfully tackled these challenges head-on. 'Crucially, they demonstrate their design can be adapted to enable its use for a variety of different and important potential applications, something that is not normally inherent to such a simple protein scaffold.'

Jennifer Newton

### REFERENCE

J L R Anderson et al, *Chem. Sci.*, 2014, DOI: 10.1039/c3sc52019f

## Recognising coeliac disease

### Immunosensor can spot reactions to gluten

An immunosensor that recognises the specific immune response to gluten generated by coeliac disease sufferers has been developed by scientists in Spain and Portugal.

Coeliac disease is a chronic intolerance to gluten - a protein found in wheat, barley, rye and oats - that leads to inflammation of the small intestine. This can cause malnutrition and diarrhoea in sufferers.

Presently, diagnosing coeliac disease involves sending samples away to be tested using laborious and expensive enzyme-linked immunosorbent assays, followed by an intestinal biopsy. But now, a team led by Agustín Costa-García, from the University of Oviedo, Spain, has made an immunosensor that recognises in serum the major triggering factors of coeliac disease: partially digested gladians.

‘These peptides [gladins] are resistant to digestion by gastric and pancreatic enzymes,’ explains Costa-García. ‘They

reach the epithelial cell membrane and pass into the cytosol, where their deamidation by the enzyme tissue transglutaminase takes place, creating epitopes with increased immunostimulatory potential.’

Dianping Tang, from Fuzhou University, China, who also develops immunoassays for biomedical applications, is enthusiastic about Costa-García’s approach. ‘This methodology is simpler than existing systems, and lower in cost. It could result in a sensitive and rapid immunoassay of coeliac disease,’ he says.

Costa-García emphasises that the immunosensor is not a ready-to-use device, but a prototype of what could be an electrochemical analytical tool for coeliac disease diagnosis. ‘We consider that these are important steps in the development of a point-of-care analytical system that will contribute to the quality of patients’ lives, reducing the need to perform invasive procedures,’ he says.

*Jennifer Newton*

#### REFERENCE

M M P S Neves *et al*, *Analyst*, 2013, DOI: 10.1039/C3AN36728B

***“Build R&D in NUTRITIONAL  
Chemistry  
continuously  
to be on the  
Cutting Edge  
of Science for  
Innovative Technologies  
with the fundamental  
basis of Chemistry Understanding  
and Human Physiology for  
Sustainable Nutrition Life long.”***

***-V Prakash  
27 April 2018***

**‘Nutrients,  
especially those  
that are difficult  
to get from and into  
the diet, could be  
transported inside  
emulsion droplets  
– A Chemistry Marvel’.**

# TRADITION, FS&T & NUTRITION



# **Nutritionals, Nutraceuticals and Functional Foods through FS&T**

***Traditional & Ethnic foods of India Region.***

***The Challenge is, compatibility of Food.***

***This is not the case with Pulses and Millets and  
Fruits & Vegetables as most of them are compatible!***

# **Tradition & Genomics to *FS&T Factors***

**A systems approach to New generation  
Technology Platform for future FS&T For  
Sustainable Nutrition Life long is an already  
distilled wisdom but does not seem to move  
in action at Policy level ?!**

DECONSTRUCTING  
**MOLECULAR  
GASTRONOMY**

**WITH  
FRUITS AND VEGETABLES,  
DAIRY PRODUCTS, MARINE, PULSES,  
MILLETS AND LEGUMES IS IMPORTANT  
AND IS MY GUT FEELING !**

**Integrated approach is the key to  
success.**

**Traditional Knowledge + Modern  
Scientific Support + Rich**

**Epidemiological data in Countries like  
India and Reverse**

**Pharmacodynamics for FS&T -  
Nutrition based approach is the key  
to success using FS&T for  
*More from Less for More.***

incredible INDIA Welcomes you



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**“If Food & Nutrition matters  
to us for Sustainable  
Nutrition Life long, *we shall  
matter more to it* through  
Knowledge sharing of FS&T  
and Nutrition Networks with  
Personal Commitment -  
*More from Less for More”***

*-V. Prakash*

*April 27, 2018*

# Thank you



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