

# Low-hanging fruit: a sign of the times?

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Perhaps it's just me but recently I have attended an ever-increasing number of meetings at which customers, agents, sponsors, and resource managers constantly advocate picking 'the low-hanging fruit'. I take that to mean that they want whatever the nominal solution is to the current problem, preferably now but certainly soon. They also want to pay the least possible amount for it while using as much existing technology and/or research as possible. The general message is simple - faster, cheaper, and sooner. Managers are implicitly asking why the returns from research cannot be accelerated like technological innovations. This strategy is unfortunately and inappropriately being applied more and more to research and development, which are processes that are certainly damaged by and eventually destroyed under such a compulsion.

When applied to the process of research the 'low-hanging fruit' metaphor, while powerful, is quite simply wrong. The term 'low-hanging fruit' is derived from a natural harvest analogy where it is nature itself that spontaneously generates and replenishes the supply. However harvesting provides progressively less and less reward if one does not plant and cultivate. The processes of research and development are not ones that naturally replenish themselves. Rather, they require our continuous and consistent resource investment. Without this investment, soon there is simply no fruit to harvest, at whatever height. Given the evident truth of this proposition, whence comes the current emphasis on low-hanging fruit?

Our research customers, for reasons that on the surface appear highly appropriate and persuasive, are under an ever-increasing time crunch. The tenure of, for example, military commanders, political representatives, or even industrial managers is generally short. So the projects that they are liable to support are those which will provide them with some validation of success by showing a return on investment before they leave. Such people are caught up in the ever-increasing emphasis on shorter cycle times for all human activities. On the surface this represents an apparent

increase in efficiency but in reality we are approaching an era in which everyone will be 'behind'. The speed of technological interaction will so outpace all human response that we shall begin to witness temporal chaos. Emphasizing low-hanging fruit is not merely to use a metaphor, it is a sign of the times as well as a time of the signs.

In focusing on the low-hanging fruit, the implication is that the high-hanging fruit will still be there to be harvested in the future when the universal trend toward ever-greater time pressure is somehow magically reversed. In reality, with the present investment strategy, such fruit will simply not blossom. Even if it does, we will not have the techniques to harvest the high-hanging fruit because the necessary research to develop these techniques will have been curtailed. Low-hanging fruit are actually the result of previous investment. Instead of trying to rescue the fundamentally flawed notion of low-hanging fruit, I want, for the moment, to substitute another agricultural metaphor - that of 'seed-corn'.

In today's world of genetically engineered crops, the traditional concept of a farmer's own seed-corn has itself practically fallen out of use. The vast majority of modern-day farmers do not reserve a part of their crop to regenerate next year's return. This modern excision of seed-corn itself, of course, is another result of the metaphorical low-hanging fruit conception. In ~~older~~ <sup>older</sup> times, the seed-corn was the vital resource that ~~makes~~ <sup>made</sup> it possible for everyone to eat next year as well as this. Seed-corn was only a small portion of the whole crop but, as is evident, was a crucial resource for investment in the future.

Each time we now hear low-hanging fruit, I'd like to substitute the metaphor of 'eating our seed-corn'. Of course, this is no absolute replacement. In past generations, we have not eaten all of our seed-corn since if we had, we would not be here now! However, the great engine of progress in many sectors of high-tech industry has been the outflow from the investment that has previously been made in research. The crucial edge that the developed world holds is not now in terms of natural resources but in terms of the accrued knowledge capital that education, development, and research have provided. Now the balance has changed from the longer-term considerations of our forebears to the ever shorter horizon of projects and



programmes of today. Even now, we are beginning to see the outfall of this policy of seed-corn consumption. The symptom of this failure is evident in the thrashing around for immediate technical fixes, rather than long-term principled solutions. In the current operational climate, a manager who thinks about tomorrow is far-sighted while a manager who thinks about next month is unemployed!

How does ergonomics and human factors fit in with these contradictory metaphors? Does our community facilitate the process of picking? Do we provide harvesting tools of better quality? Package the collected fruit for market? In a sense we do each of these things. Those involved in the day-to-day applications of ergonomics and human factors are constantly seeking ways to apply the knowledge in order to make things better. However, this rightful emphasis is on applications but my fundamental concern here is on research. Where do our research ideas come from? In our own realms of research and development, we have relied in our first generation on the abstraction and application of theories and models from our parent disciplines such as psychology and engineering. Where would we be if the theories of response capacity such as Fitt's Law, the Hick-Hyman law, and Wickens' Multiple Resource Model of attention had not been developed? Indeed, our very origins lie in the search for universal laws of work. In a sense, we in ergonomics and human factors have already picked the low-hanging fruit, or more charitably, we have selected those conceptions of behavioural response most relevant to real world applications. However, where are our second generation theories? We now know that the context of performance is critical to response prediction in the real world. This means that acontextual relations such as Fitts' Law remain informative but we cannot simply abstract laboratory-based theories of behaviour in the hope they will each apply in complex real world conditions.

Whence comes our future seed-corn in ergonomics and human factors? Especially in relation to predicting behavioural response, we have largely eaten the first harvest but few new crops have been planted. It is all well and fine to reap the rewards of the foresight of our forebears but we also must plant and invest. Picking low-hanging fruit, while self-centered in the short run, will leave us bankrupt in the near future. Without

tree-growers we will eventually all become a population of starving fruit pickers! It is evidently a test of character as to who cares and who doesn't about such an eventuality.

Accurate prediction of real-world human response is neither a simple, nor a short-term enterprise. That such accurate predictions are critical however, is evident to anyone who surveys the current state of technological development and the continual but unsuccessful aspirations of some sectors of the engineering community to somehow excise the last human operator from the system. What we now require, in stark contrast to 'low-hanging fruit' is a programmatic investment in ~~the~~ research in human behaviour in technological environments of the same order of magnitude as the vast expenditures on systems engineering and manufacture. I am thus advocating for the resurrection, in the US, of Governmental Career Grants Programs (since much of the first crop of behavioural advances ~~came~~ <sup>was</sup> supported) as well as international 'nationwide research centres on human performance prediction. These programmes would represent a true investment. They would not be the three to five-year shades of programmes which we now see. I know many dedicated programme managers who would embrace and very much like to pursue such a course, and our collective voice must support such insightful and courageous individuals. For indeed, in the absence of programmatic research, or more specifically, the absence of coherent theories, we are doomed to an ever-increasing sequence of poorly conducted, ad hoc case studies as an unending series of momentary problems leap to the fore. This 'brush-fire extinction policy' is eventually doomed, although unfortunately each succeeding generation of researchers would see each sequential incarnation as the status quo. In this unhappy circumstance, the seed-corn has been consumed, the fruit tree is not simply bare, since those who look to harvest the fruit are now cutting the trees down. Consumers get ever hungrier as we even lose the fundamental skills of cultivation! Perhaps we need to abandon all such metaphors and hopefully, this black view of our future is simply that, a doom-laden vision generated from my own present pessimism. But if you're in a meeting with me, do not mention low-hanging fruit, the personal outcome for you may be my removal of all your harvesting privileges!

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