

CREATIVE PROBLEM SOLVING IN LOCATION BASED SERVICES

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ABSTRACT--This paper aspires to throw light on visionary, intrapreneurship orientation among intrapreneurs who bring about unconventional, inventive changes through location based service applications. Intrapreneurship is described as an experiential, constructive process of creative problem solving, innovation initiatives within organisations to address challenging problems existing in the society. The authors primarily executed a factual, interview based fundamental research on 50 engineer's intrapreneurial direction and creative, problem solving approach in a semi-conductor company. Intrapreneurs in a semi-conductor company have interesting idea imaginations, visualisations, formulations, innovations and thus conceive design solutions and business models that are innovative and insightful. The authors have provided crucial insights into the gradual advances in creative problem solving scenarios dealt by intrapreneurs and their notable, intrapreneurship orientation through exceptional, location-based innovative solution initiatives. The eventual results of this investigative study present efficient insights into the flourishing creative, problem resolving ways that encourage intrapreneurship orientation trends in the IT Industry. Further, it reveals, innovative work behaviour tendencies within similar technology organisations and explores the various revolutionary initiatives and their successful implementation for the social transformation of the society. The paper studies successful case stories of location based service applications and identifies successful creative problem solving approaches and intrapreneurship orientation skills for innovative value creation.

Keywords--Osborne-Parnes Creative Problem Solving, Intrapreneurship Orientation, Innovative Work Behaviour, Location Based Services, Social Transformation Initiatives

I. INTRODUCTION

“Creative imagination is forward-looking and nurtures scientific innovation by considering various scenarios, new ideas, alternatives by viewing existing problems with an empathetic, solution-oriented perspective”. Albert Einstein

Intrapreneurship is defined as an integration of progressive, collective ideas, intentions, endeavours, behaviours, acts within an organization that lead to the implementation of empathetic, innovative solutions. It is a process of visualisation and articulation of new dream ideas and converging them into realities through new products, services, techniques and strategies((Toftoy & Chatterjee, 2004)). We are living in a highly formidable, inspirational, unpredictable, multiplex environment where intrapreneurs must be flexible and enterprising to identifying constructive business constructive solutions for dealing with several composite problems and opportunities in the society((Baruah and Ward, 2014).

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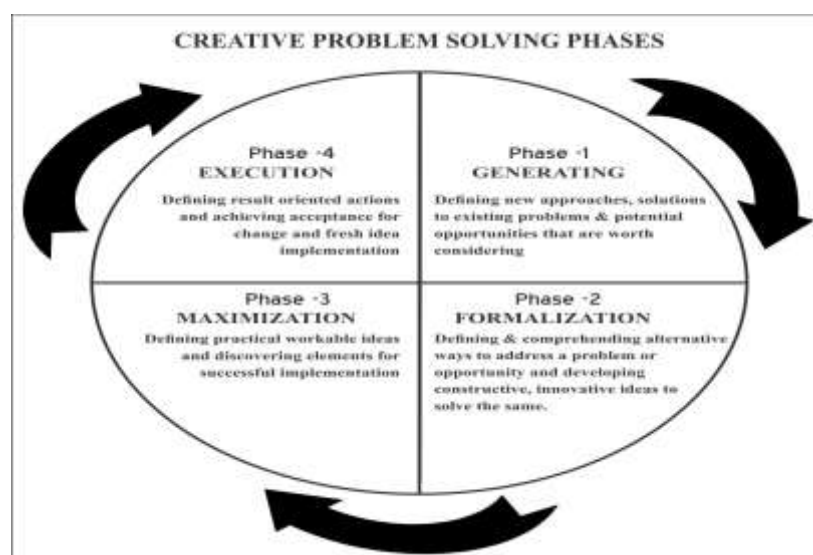
There is a need for a constantly creative, empathetic, problem solving, innovative intrapreneurship orientation among employees. Empathetic intrapreneurship potential must be recognised, encouraged and built-in within organisations. Critical intrapreneurial skills must be convincingly developed and strategically established through research, inquisitive fact-finding and new endeavours through plausible intrapreneurship, innovation possibilities (Foley, 2017).

II. LITERATURE REVIEW

Creative Problem Solving

Creative Problem Solving is a distinguished, capacity building, application-oriented technique constituted by Dr. Sidney J. Parnes and Alex Osborn during 1950s. This technique is noteworthy as it consciously enhances both divergent and convergent imaginative thinking by exploring, evaluating, interpreting and determining the most suitable choice from diverse possible alternatives for purposive decision-making((Baruah & Ward, 2013)). Creative Problem Solving technique is an integrated process involving four complete Phases- Generating, Formalisation, Maximisation and Execution(Refer Table 1-Circular in Cycle Form).

Table 1 : Creative Problem Solving Process Cycle With Four Phases



Source: Author's Work

- Generating is the primary, initiating phase involving anticipatory development of new propositions, recommendations, directions, specifying details of noticeable problems and appreciable opportunities. It is the realisation, recognition and understanding of pursuable, potential opportunities.
- Formalization is the comprehension of the concerned problem to develop multiple alternative possibilities and solutions.
- Maximisation is the identification of practical constraints and examining appropriate plans within existing resources.
- Execution is the ultimate, definitive phase that completes the creative problem solving activity with keen, action-oriented, implementable ideas.

Intrapreneurship aims at identifying problems and opportunities and addressing them creatively with optimal solutions.

Intrapreneurship

Intrapreneurship refers to creative, motivated endeavours, new pro-active, distinctive business actions or opportunities or initiatives undertaken by individuals within organisations by their own self-initiative((Antoncic and Hisrich, 2003); Menzel, Aaltio and Ulijn, 2007); (Camelo-Ordaz et al., 2011); Falola et al., 2018)).

Employees with productive, intrapreneur orientation are pathfinders and pioneered in identifying advantageous opportunities. They productively engage in gathering new insights and brainstorming new business ideas, strengthening capabilities to create commitment, empowerment and involvement for going beyond the extra mile intrapreneurs constantly upgrade their capabilities to identify potential opportunities for purposeful value creation and business rejuvenation((Parker, 2011);(Venn & Berg, 2013); (Foley, 2017);(Lapointe, 2019)).

Innovative Behaviour

Innovative behaviour can be defined as “a proactive, conscious furtherance of new, creative, ideas, thoughts, approaches, capacities of individual within a position, group, or organization” (Zhu et al., 2014). Intrapreneurship-oriented innovative work behaviour should ignite ideas with a creative problem centred approach and provide trustworthy commitment to addressing problems through collaborative social networks and empowerment of people, encouraging strategic capacity building, knowledge enhancement, learning-oriented behaviour, transformational leadership through practical engagements(((Jong & Hartog, 2007);(Yuan and Woodman, 2010);(Probst et al., 2013); (Bysted and Jespersen, 2013))).(Refer Table 2).

It should drive appreciation, faith and responsiveness towards others feelings, sentiments and requirements(Elert, Stam, & Stenkula, 2019).

Table 2: Elements of Intrapreneurship Oriented -Innovative Behaviour

Intrapreneurship Oriented innovative Behaviour	Recent Research Authors
Life Changing, Revolutionising Leadership	(Tu & Lu, 2012); (Baruah & Ward, 2014); (Afsar, F. Badir and Bin Saeed, 2014); (Li et al., 2019); (Amankwaa, Gyensare and Susomrith, 2019)
Innovative Issue Resolution	(van Aken et al., 2007); (Baruah & Ward, 2013); (Figl & Recker, 2016).
Reliability and Belief in Relations	(Rivera, 2017); (Lapointe, 2019); (Elert, Stam, & Stenkula, 2019)
Commitment towards innovation	(Ma, Liu and Karri, 2016) ;(Farrukh et al., 2017)
Partnership and Networking	(Madrid et al., 2013); (Wang et al., 2015); (Falola et al., 2018)
Delegating for Empowerment	(Fernandez & Moldogaziev, 2013); (Sohail and Malik, 2016); (Nyland, 2017); (Falola et al., 2018)

Practical Engagement	(Madrid et al., 2013);(De Spiegelaere et al., 2014); (Elert, Stam, & Stenkula, 2019).
Strategic Knowledge Capacity Enhancement and Management	(Bysted and Jespersen, 2013); (Ma Prieto & Pilar Pérez-Santana, 2014); (Michaelis et al., 2015); (Zhou and Li, 2012)
Appreciation of Other's Emotions	(Gündoğdu, 2012); (Paxson, 2017); (Gibbons, 2018)

Source: Author's Work

Location Based Services

Location-based services (LBS) are services that provide information on real-time geographical map and navigation data to track a vehicle, restaurant, person, shopping mall, real-estate(Agarwal, 2009). They generally consist of four essential services: Navigation Maps(Assistance on map routes), Tracking Services(Finding a friend, family, vehicle or traffic update),Information Services(Yellow page location addresses and contact numbers, city tourist guides and user generated data) and Application Services(Context advertisements and social networking).

The value chain of location based service comprises of location providers like skyhook, Gagan, Glonass; location based technology services developers(Silicon India Radio Frequency(SiRF), Qualcomm, Navizon, Texas Instruments and Indoor Atlas; Map Providers like Google, Garmin, Tom Tom, MapQuest, HERE. Navteq, Micello Inc; Platform Providers like Shopkick Inc, Aisle411, Ericsson, Polestar, Alcatel-Lucent; Application and Content Providers like Google and Meridian Apps; Handset Providers like samsung, Apple, Motorola, LG, Lenevo, Xiaomi(Wagner, 2015). An amalgamation of the each of the various types of location based services specifically helps in practical, imaginative, value creation initiatives in location based services.

Intrapreneurs of Location based services are desirous and purpose-oriented for achieving new change and hence continuously strive to renovate the diverse configurations of service offerings and products with simple, interesting initiatives((Madrid et al., 2013); Ma, Liu and Karri, 2016)). Many interesting location based social transformation initiatives (Goodrich, 2018) have been introduced. Some of them are discussed below in Table 3.

Table 3: Location Based Social Transformation Initiatives

Location Based Service Initiatives	Description
Shopping Outlet Locations	Prospective consumers can easily identify nearest shopping outlets in neighbourhood with location-based intelligence.
Commercial Advertisement	Mobile marketing is used to communicate advertisements extensively to attract prospective customers.
Traffic Updates on Google Maps	Location-based Service can deliver real-time geographical location information update on traffic status to the mobile user.
Cab Booking	Location-based service can book a cab ride real-time on demand
Weather Updates	Location-based Service can deliver real-time geographical location information update on weather update to the mobile user.

On-Road Assistance	Location-based Service can provide prompt roadside help via an app that helps pinpoint the exact location where someone has met with a mishap or a vehicle breakdown.
Field Sales Work Force Tracking	Location-based Service are employed by diagnostics companies and sales, logistics-dependent companies for tracking field sales staff at different locations, and enables them to mark attendance or check into device location.
Secures Finance Transactions	Location-based Service prompts credit/debit card transactions with several customers at different geographic locations.
Security Management	Location-based Service enables location surveillance, information update and supervision through data transfer from location installed camera.

Source: Authors Work

Source: <https://www.businessnewsdaily.com/5386-location-based-services.html>

Design Thinking-Empathy Maps

An empathy map is a collaborative, expressive, visualization technique that is used to demonstrate our common understanding and knowledge of a user, user's needs to assist in goal setting and better decision making.(Refer Table 6). An empathy map has 4 quadrants formally comprising of Say, Think, Does, and Feel, where the user is placed in the centre intersection of the four quadrants.

Empathy maps provide a complete, wholistic reflection of the user and their attitudes and behaviours (Gibbons, 2018). They help in classification and interpretation of user and end-user-interview transcripts and discovers knowledge on related aspects, ideas, perceptions and opinions. It helps in identifying and creating end user personas and setting goals for action plan on location based services.

III. RESEARCH METHODOLOGY

A purposive, convenient, theme-based, exploratory “emergent design” qualitative research study was conducted to understand intrapreneur – innovative behaviour of 50 engineers employed in a semi-conductor company was conducted. An identical-parallel sample of adequately well qualified, multi-level engineers was selected to propose and present earnest ideas on location based applications. They were purposefully and concurrently interviewed in their presentations to study their ideological drive, insider viewpoints, understandings, knowledge, perspectives and future dreams. The demographics included 44 Male 6 Females; within the age group of 26-55; work experience ranging from 2-25yrs; qualifications range falling in B.E(Electronics &Communication), BTech(Computer Science), MTech and others. Out of the total participants, there were 6 Technical Managers, 6 Technical Architects and 30 Software engineers, 4 Program Managers, 2 Marketing Manager, 2 IT Managers. The interviewees were asked to describe their current job descriptions, propose design-thinking, empathetic ideas and identify their relevant intrapreneurial skills with possibilities to translate respective ideas into realities.

During the flowering of ideas, development and presentation stage, they were observed on key intrapreneurship orientation behaviours.

Roughly 10 Software Engineers and 2 Technical Architects and 1 Program Manager with experience range between 6-17 year's experience and qualification B.E(Electronics &Communication) and B.Tech(Computer Science) came up with relevant workable, user-friendly, unique ideas through reflection, experience and collaborative efforts while rest of the intrapreneurs were found lacking in sufficient creative problem solving, proactiveness, risk-orientation, collaborative action, solution-orientation, foresight, decision-making and research and development skills. These intrapreneur engineers lacked independent initiative in experimental-learning opportunities, or experiential activity-based learnings. They came up with routine, customary ideas and mostly marketing department was found deficient in appropriate research and development skills. Their intrapreneurial orientation behaviour was found to be deficient in extraordinary, creative, critical thinking initiative skills. It was identified that unconventional thinking could be improved through problem identification, participative reasoning, rational judgement, action-based decision-making training, demonstrations, brown-bag knowledge sharing sessions and research-based learning opportunities.

The researcher understands the emic and etic viewpoints, interests and perspectives of intrapreneurs and stakeholders while moving back and forth to understand that intrapreneurs need to be nurtured through roadmap sharing, empathy maps, market research exchange programs, employee communications and engagements. The intrapreneurs must familiarise themselves with challenging field opportunities and develop strategies for experimentation and innovation(Kavensky,2018).

Intrapreneurs are unique idea aspirants, opportunity seekers, goal developers who take on dialogical leadership for experience sharing, knowledge-exchange for acquiring innovative intrapreneurial efficiency (Zhou and Li, 2012). They utilise creative problem solving techniques, expertise and knowledge with transformational leadership capacity building skills to generate need-based new solutions for gaining market competitiveness.

This qualitative research study has descriptive and interpretative validity. Descriptive validity has authenticity in reporting and recording descriptive information about observable reality events, imaginative ideas, intrapreneurial behaviours and settings. There is consensual verification of observations made by multiple onlookers, observers and investigators leading to credible, justifiable research.

Further, the qualitative research study has Interpretative validity where it accurately expresses and reflects the participants inner thoughts, views, aspirations, feelings and resolutions. This accurate interpretative validity approach is sensitive towards the participant intrapreneurs real outlook, belief and intentions. The use of multiple interviews and observations to understand different perspectives and vantage points helped in getting agreement on factual information related to location based services and eventful ideas.

As a result, the qualitative researcher could study the participant's prospective standpoints, feelings, frame of references and action-based outcomes to develop an insider-view and definite narration of their potential interests, ambitions, resolutions and capabilities related to location based services. The qualitative research documents particularistic findings related to intrapreneurship oriented innovative behaviour skills and competencies in specific contexts(Table 4)and provides idiographic causation related to recent, purposeful, well-intentioned causes of distinct behaviours, actions, outcomes and happenings(Refer Table 6).

IV. FINDINGS & DISCUSSION

The descriptive, theme-based exploratory interview research rifles through the thinking and reasoning of intrapreneurs location-based services ideas. These revealed several intrapreneurship-oriented innovative behaviours, skills and competencies that can be defined and illustrated through several action behaviours(Refer Table 4). The themes were integrated with definitions and observable, illustrative action-oriented behaviours which are as follows:

Table 4: Intrapreneurship Oriented Behaviour Skills/ Competencies

Intrapreneurship Oriented Behaviour Skills/ Competencies	Competency Definition	Illustrative Action Behaviours
Problem Identification	Predict, identify, and define key concerns and problems, look for root causes, develop practical, action-oriented, time-driven, realistic solutions.	Predicts and analyses problems and anticipates respective causes from multiple perspectives. Chalks out action plans, resources, techniques and expertise to develop best solution to problem.
Creative Problem Solving	Identify opportunities and consider new perspectives to overcome hindrances to reach pre-defined goals.	Recognises situations, problems/ opportunities, seeks more factual information, develops multiple, creative alternatives and selects appropriate course of action
Initiative	Initiative is proactive action-orientation, addressing immediate opportunities or problems to create value for future.	Recognises problems/opportunities and aims at resolving them in shorter time frames. Establishes favourable, action-oriented plans and optimises use of available resources. Projects alternate ways of action.
Critical Thinking	Ability to analyse and view things from different perspectives and breaks problems into sub-parts to achieve outcomes	Challenges established processes, opinions, perspectives. Identifies and analyses root cause of problems, collects relative information, breaks problems into understandable parts
Collaboration	Collaboration is the ability to communicate, align and share information with others for shared consequences.	Displays willingness to share expertise, information and insights with other team members. Respects and values other's experience, expertise, knowledge and inputs and

		encourages others to contribute with more initiatives.
Decision-making	Decision-making is the ability to generate effective alternatives and evaluating associated risks and rewards with alternatives to choose an appropriate choice of alternative that provides a friendly outcome.	Predicts the consequences of decisions; Engages people affected by decision-making, Takes goal-oriented risks, practices prioritisation of key issues and takes confident approach in case of unknown situations.
Interpersonal Relations and Respecting other's dignity	Interpersonal Relations and Respecting Other people's dignity and pride by showing concern, feeling, understanding for others outlooks, perspectives and desires	Actively listens and responds to others empathetically and appropriately. Displays understanding of key underlying issues and analyses reasons for them.
Empathy	Empathy is a deep sensitivity, respect and appreciation of others situation, experience and consideration of viewpoint and taking appropriate action to help the other .	Visualising others attitudes and beliefs on an empathy map. Listens attentively to understand unspoken words, confusions, apprehensions and comprehends the unsaid in communication. Displays in active involvement, curiosity and interest in knowing others.

Source: Authors Work

Further, the Design Thinking-Empathy Maps emerging from Intrapreneurship Oriented Innovative Behaviour were discussed. The various groups of participants illustrated their prospective ideas on location based services through an empathy maps conveying the verbal expression, experience, action and emotion involved in a particular location based service(Refer Table 5 for attached example) and setting goals to implement it successfully. Each location based service idea provided a unique experience to encourage intrapreneurs to undertake design thinking to implement a user-friendly solution from intrapreneurship oriented innovative behaviour(Paxson, 2017).

The empathy map helped researcher in interpretative validity whereby the researcher could get into the head of participant intrapreneur's and accurately determine their viewpoints and meanings and thus obtain participant's factual feedback on where they want to go or what they want to innovate for social benefit/utility.

Thus, Design thinking empathy maps helped researcher in interpretation of participant intrapreneur's willingness to collaborate and better understand the user and their needs, emotions, expression to build creative problem solving, purposeful, social utility location based services applications(Refer Table 6). It provided a key

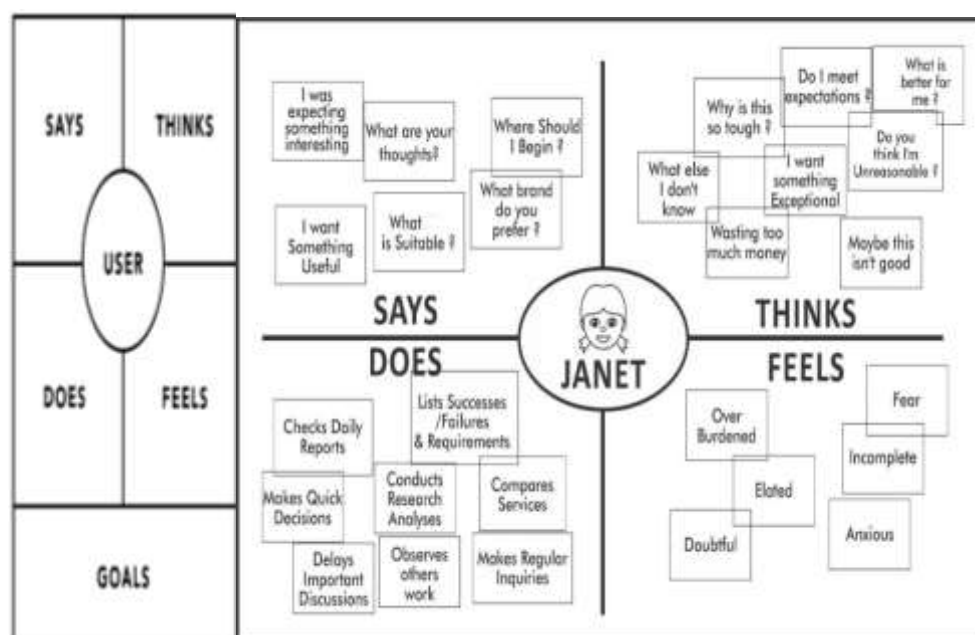
insight into the gradual upsurge in the empathetic problem-solving scenarios undertaken by intrapreneurs and their intrapreneurship orientation through notable location-based innovative solution initiatives. Complex problem solving undertaken by participant intrapreneurs through design empathy maps reflected strategic intrapreneurial energies through experimentation.

The CEO played a key role in stimulating interest, inspiring change innovation, directing competencies and providing change leadership to drive intrapreneurial mind, attitude and spirit among its employees ((Baruah & Ward, 2013);(Lapointe, 2019)). Intrapreneurs and CEOs of location based services company used design thinking empathy maps to deliberate and create new value propositions with unique experiences (Tu & Lu, 2012).

The example of Trip Advisor app on an empathy map shows the actions and emotions engaged by the intrapreneurs to understand the building of innovativeness of applications with integrative thinking(Wang et al., 2015) with the goal of developing a Trip Advisor App.

Example: Empathy Map: Goal -Trip Advisor App

Table 5: Empathy Map Descriptive Empathy Map



Source: Authors Work

Source: <https://www.nngroup.com/articles/empathy-mapping/>

Some of the unique, enterprising, exemplary idea applications that assure and fulfil fundamental need expectations for everyone's advantage are implemented in the market and derived from field inquiry and study((Nicolaidis and Kosta, 2011); (Paxson, 2017)) These are thus presented in("9 Hot Ideas for Location-Based Apps", 2019). (Refer Table 6).

Table 6: Location Based Social Utility ideas

LOCATION BASED SERVICE App	SOCIAL UTILITY AND IDEA
Alarm Me	Alarm-Me is an app that awakens regular travellers as they approach their destination
Day Track	Day Track app is an employee tracking app used for tracking field sales day activities, GPS location real-time, attendance, sales visit, sales order procurement, payment collection, recording day to day expenditures. (Goodrich, 2018)
Ola Cab	Ola cabs app offers a quick and easy way to book a ride
Uber Cab	Uber app offers conveyance services for local distance travel. (Aleksandrova, 2018)
Trip Advisor	Trip advisor offers travel options for various excursions, outstation locations
Instagram	Social Networking Chatting App
Strava	Strava offers real-time fitness connections to fellow runners and cyclists and tracks their speed
Happn	Happn is a social dating app whereby humans connect for intimacy

Source: Author's Work

V. PRACTICAL IMPLICATIONS & CONCLUSION

The qualitative research study reveals that factual based descriptive validity, interpretative validation and inside-outside legitimization portrays the participant intrapreneur's meanings and viewpoints and provides insider's viewpoints to the researcher. These insider viewpoints can be reflected in the creative ideas generated for day to day problem resolutions. The development of interesting location based service applications corresponding to user's internal desires and motivations addressing routine needs have practical implications towards society-friendly initiatives (Devloo et al., 2014; Paxson, 2017). They have future scope in revolutionising the society and enriching the users with new creative problem solving considerations, approaches, experiences, learnings and application skills. This paper shows that intrapreneurship innovation contributes to empathetic mapping of the needs of the society and four phased creative problem solving can be encouraged among practitioners, academicians and entrepreneurs to bring out attractive, workable citizen-friendly ideas. The Engineer Managers can use the definitions of competencies for observable, illustrative behaviours to conduct justifiable performance reviews, design suitable training-engagement programs for upgradation of intrapreneurial innovative behaviour/skills of their team associates to help in developing newer, innovative trends and outcomes in the IT Industry. Thus, progressive intrapreneurship oriented innovative behaviours and skills can help in an appreciative inquiry of "what other illustrative action behaviours can help?" in furtherance of contributory ideas for revolutionary, social change initiatives all around the world.

The exploratory research study provides that location based services companies bestow unique opportunities for intrapreneurs to undertake strategic, integrative reasoning, fusion of experiential learnings for evolution of unconventional, problem-solving ideas for universal techno-innovative change. It promotes real-time, insightful, problem identification, situational understanding in techno-proficient intrapreneurs for handling perplexing human situations and constraints. Intrapreneurs are constantly inspired to critically think and conceptualise incremental ideas into application-based pursuits for converting diverse, problem opportunities into new value propositions for accelerating, inventive change through creation of advanced, user-friendly applications. The intrapreneur invests time and effort in researching new innovation opportunities and converting them into realistic application-oriented, market-value ideas that encourage time-efficiency for consumers.

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