

Futurama 2.0 : Mobilizing America's Transportation Revolution

Assembling a visionary team
to create innovative, sustainable
and viable solutions for all
future transportation in the
United States

Proposed by
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EXECUTIVE SUMMARY

Futurama 2.0 : Mobilizing America's Transportation Revolution

America's future as a global leader depends on **new, advanced transportation solutions** capable of handling the realities of global economics, serious environmental issues, energy and resource scarcity, changing public values and national security. These solutions should be considered and developed as a totally **integrated systems network** rather than a patchwork of separate systems.

The timing is now perfect for America's forward-thinking political leadership to appoint a truly independent, multi-disciplinary, design-based team to create a compelling vision for this country's long-term transportation needs. After creating this vision—one that addresses energy, water, ecology and transportation from a holistic systems perspective—the team will lead the research and validation activities required to define a blueprint for the next 50 years. From this benchmark, smart and reliable government policy can be created with clarity and confidence for the common good.

The original 1939 Futurama vision exhibited at the New York World's Fair and the subsequent Federal-Aid Highway Act of 1956 radically transformed American society and its economy. The resulting national highway system allowed the country to flourish for decades. Today, however, transportation as we know it, based on that original vision, policy and legislation, is in serious trouble.

A bold, new, innovative Futurama 2.0 vision is needed for the next 50 years and beyond.

To create such a vision and help turn it into reality requires an **extraordinary, multi-disciplinary core team** that will collaborate using a systems approach driven by **design methodology**. Because the **design discipline** is at the center of vision and innovation, the creative techniques used by designers will be central to the core team's process. Design methodology also offers the advantage of effectively embracing the input and expertise of many disciplines—this is essential, because a future transportation blueprint derived from the **Futurama 2.0** vision must result from collaboration among a wide range of disciplines.

The **four major motivations** for assembling this visionary team and creating the Futurama 2.0 blueprint are to achieve (1) the **highest ecological standards**, (2) **long-term American prosperity**, (3) **social equity**, and (4) **national security**.

At a time when the White House administration is bold enough to initiate the necessary changes to be made, **Futurama 2.0** offers the administration a way to generate optimism and solutions based on a fully researched and validated vision that the American people can trust and enthusiastically support.

Extraordinary nations require extraordinary solutions—and extraordinary solutions require an extraordinary team.

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INTRODUCTION

Futurama 2.0 : A Smart Transportation Vision Capable of Reinventing the Great American Dream

After World War II, the Federal-Aid Highway Act of 1956 contributed significantly to the Great American Dream. This massive program of highway and freeway construction transformed our nation, allowing commerce to thrive on a new scale, and creating unprecedented demand for personal transportation. What inspired the United States to enthusiastically undertake a project of this magnitude? Historians point to the Futurama exhibit presented at the 1939 New York World's Fair.

Futurama created a new, all-encompassing, nationwide vision for transportation. The exhibit presented in convincing detail high-rise urban landscapes built around and connected by a national network of freeways, envisioning a highway system that would link the entire country. It was no accident that the exhibit, sponsored and largely created by General Motors, presented automobiles and road vehicles as the principal means of transportation.

Its appeal was augmented through exciting design: Every aspect of the exhibit—buildings, landscape, infrastructure and vehicles—was carefully designed to convey compelling, futuristic solutions that appeared imaginative yet achievable to both public officials and the viewing public. Even the U.S. military was satisfied with the plan.

Futurama's brilliant vision supported the post-war Great American Dream of a growing nation characterized by bustling businesses networked together

through innovative transportation solutions. The conditions in history were ideal for expansive change and Futurama provided not only a vision but also a blueprint to follow. Private industry and government followed the blueprint, working together to implement the exhibit's vision as a long-term solution for moving people and goods around the country. The enthusiasm that Futurama generated catapulted many aspects of its vision into reality within two or three decades of its debut in 1939, creating a significant number of jobs and establishing long-term economic prosperity.

Unfortunately, this 70-year-old vision has never been reevaluated or revised, even though our nation has changed dramatically and current transportation systems in America are in trouble. Both the Great American Dream and the original Futurama vision are now clearly unsustainable; they are no longer viable for the future well-being of America and its citizens in the twenty-first century. The lifestyle that Futurama encouraged, as well as the economy that sustained it all these years, assumed infinite natural resources and ignored massive ecological degradation of the environment through toxic and non-biodegradable waste.

It is time for a new vision—and a bold new blueprint to follow.

In 2009, amidst worldwide handwringing, it appears that the **Great American Dream 2.0** is in the process of being defined, as public and political discussions focus on new global realities of commerce, security, ecological responsibility, climate change and more equitable social terms. To support this new model of the Great American Dream, the nation needs **Futurama 2.0**.

The United States must strive to regain economic, social and industrial prowess that is sustainable and com-

elling. **Futurama 2.0** must be a central component, providing excitement and vision that can point the way. In the same way that the original Futurama inspired public and private partnerships to turn its well-designed vision into reality, **Futurama 2.0** would motivate today's government and private industry to develop comprehensive transportation policy and its implementation for the common good. The conditions at this moment in history are again ideal for expansive change. **Futurama 2.0** will provide a strong vision and detailed blueprint for personal mobility and freight transportation in America. **Futurama 2.0** will be the platform for national transportation and transportation-related policy.

Other countries are actively overhauling and updating their transportation systems. China, in particular, is attempting to undertake major new national transportation and urban redevelopment projects, funded and led by its central government. It is politically unimaginable for the federal government of the United States to undertake on its own the huge investments necessary for projects of this magnitude. The U.S. can, however, set up smart, visionary and effective policy and legislation that will drive and energize private or public/private enterprises to make the necessary investments. This policy can also set up an environment that ensures a fair, competitive framework within which private enterprise can thrive while creating effective new transportation solutions.

Futurama 2.0 can be turned into reality with progressive policy that drives and rewards appropriate innovation. This approach can work well. As an example, America and much of the world now have relatively low-emissions automobiles due to strategic policy and regulation. A multi-disciplinary research team can create

and validate the vision from which game-changing policy is made. The formation of a multi-disciplinary team is critical, because **Futurama 2.0** will be complex; knowledge provided by numerous specialists as diverse as urban planners, transportation designers and sociologists will be critical to the team's success. To ensure that **Futurama 2.0** meets the needs of all Americans, the team must draw from a wide spectrum of viewpoints and vital realities.

Central government funding allowed the implementation of the original Futurama vision in the form of the Federal-Aid Highway Act of 1956. Once again, central government has the opportunity to make possible the vision as well as its implementation. **Futurama 2.0** would seek broad consensus, expanding beyond the narrow interests that created the 1939 Futurama to ensure that all stakeholders are included.

Futurama 2.0 : What It Will Be

The original Futurama prioritized the issues of the 1930s and '40s. Today, it is critical that America's transportation systems serve our current and future needs to produce efficient mobility while conserving energy, water and our environment. America is currently using a transportation system that reflects issues and influences from 75 years ago. As our planet and its inhabitants progress, the necessary infrastructures and systems must accommodate future realities and needs.

Enter: Futurama 2.0.

The authors of this white paper (Muyres and Wardle) recommend an open-minded and multi-disciplinary approach for determining what **Futurama 2.0** should be. The best solutions are almost certainly too complex to be obvious before exploration. As this team looks ahead to America's needs 20, 30 and 50 years in the future, **Futurama 2.0** should be driven by efficiency, zero net ecological impact, accessibility, innovation and pragmatism, as well as excitement and optimism about the nation's future.

Futurama 2.0 will study and analyze all modes of transportation, but it will also consider a more fundamental question: **Why do people need to make journeys in the first place?** This process will explore how people would prefer to lead their daily lives, which will naturally lead to a critical evaluation of the automobile. The average American commutes to work alone in a vehicle at least 20 times his or her own weight—we already know that this inefficient consumption of scarce or carbon-emitting energy sources is not sustainable.

Automobile accidents have caused suffering on a scale never imagined when the first Model T rolled off the assembly line. The automobile, which is the primary mobility option for most Americans, contributes to our national transportation problem. **Futurama 2.0** must address this dangerous, unsustainable, inefficient but ubiquitous form of transportation.

Inspiration can be found internationally. Europe and Asia, while different in many ways from the United States, have much to inspire in the area of mobility solutions. The core team developing **Futurama 2.0** can learn from the creative alternative modes of transportation that Europeans and Asians have implemented—and often choose to use instead of their cars.

Acquiring and developing rights-of-way for new transportation in vast areas of the United States is not practical, affordable, or ecologically defensible. Therefore, much emphasis needs to be placed on **smart technologies** that allow the current transportation infrastructure to be repurposed or utilized far more efficiently than it is today.

In order to guide and influence the future development of integrated urban landscapes and transportation networks, **Futurama 2.0** must contain the following attributes:

- **Highest ecological standards**

All aspects and subsystems of **Futurama 2.0** must aim to have as close to zero ecological footprint as the prevailing technology and thinking can realize.

- **Compelling solutions**

All aspects of the solutions must be compelling to the public as well as government and private enterprise.

- **Seamless integration**

The total network of transportation modes for both people and goods must integrate seamlessly. Congestion should become unknown.

- **Quality of life assessments**

Future transportation solutions must be informed by a much higher understanding of the connections between leisure, work, urban planning, access to mobility, manufacturing, food production and the distribution of goods.

- **New jobs**

Futurama 2.0 will ensure a healthy demand for new infrastructure, hardware and technology development, creating huge opportunities for domestic enterprises (including the automotive industry).

- **Automated systems**

Smart technologies will allow much more efficient utilization of current road, rail and airspace infrastructure, which will likely continue to be extremely important. This can significantly reduce the demand for new rights-of-way to provide future transportation modes that will be needed.

- **American leadership**

Futurama 2.0 can provide an exciting opportunity for American enterprises to become global leaders in transportation and mobility technology, manufacturing and business.

- **Inclusive mobility solutions**

New transportation solutions must provide for the widest segment of the American population.

- **Revolutionary road vehicles**

Considerably smarter, innovative, more fuel-efficient and non-polluting road vehicles are required if they are to continue to be an important part of an updated and efficient transportation system.

- **Safe solutions**

Futurama 2.0 must aim to minimize the high levels of death and injury that are an unintended consequence of the original Futurama. If automobiles are to contribute to future transportation in America, the industry must utilize radically new approaches to safety to substantially reduce human suffering.

VIEWPOINT

Delivering **Futurama 2.0** : Assembling and Empowering the Appropriate Team

A new vision of the nation's overall transportation system is poised to drive the next chapter of American history—but not without a truly multi-disciplinary team of collaborative, open-minded experts. America's future transportation systems should be sufficiently sophisticated to drive the nation's future prosperity and global leadership while exploring and developing sustainable solutions that balance ecological integrity, social equity and economic viability. The complexity of these goals needs leadership representing wide-ranging areas of knowledge.

In fact, planning for transportation needs that will establish America's future mobility requirements for the remainder of this century will create an enormous systems integration challenge. As a result, the solutions flowing from this team cannot be planned by transportation experts alone. To fully imagine and design **Futurama 2.0**, appropriate experts will need to explore ideas, policy and research pertaining to energy, energy storage, communications, information technology, design, ecology, urban planning, national security, economics, the future of the global economy, social science, materials, manufacturing technology, government agencies such as the DOE and DOT, and systems engineering, among others.

The Core Team

Futurama 2.0 needs an extraordinary team: a federally funded **core team** of approximately eight to twelve carefully chosen individuals who represent expertise and understanding of all the disciplines and stakeholders needed to contribute to a panoramic, vibrant and

viable transportation vision. Considerably more than twelve disciplines will contribute to the entire **Futurama 2.0** effort; however, high-performing innovation teams operate best with a small, highly focused and disciplined leadership corps at the helm. Design thinking within that team will be key to integrating the many disciplines that will be consulted as well as successfully synthesizing ideas.

This core team will operate in two consecutive phases:

Phase 1: The **core team** will create the compelling **vision** of **Futurama 2.0**. The **core team** will brainstorm, debate, develop innovative connections, research, decipher, evaluate, articulate and present the overall vision. During this process it will consult with others for validation of ideas.

Phase 2: The **core team** will then translate the vision into a robust **blueprint** that can **inform** crucial **policy-making**. To achieve this, the **core team** will lead, coordinate, outsource and choreograph the vast amount of research, modeling, costing and validating activities required to appropriate experts, organizations or institutions.

Core Team Attributes

A carefully selected core team is critical to the successful development and implementation of **Futurama 2.0**. Members would be chosen for their appropriate backgrounds; their motivation to find solutions; their access to relevant individual or institutional expertise; and their personal ability to work open-mindedly, collaboratively and without self-interest.

This core team will be uniquely defined by the following attributes:

- **Focus**

While many groups and organizations are conversing about or recommending new transportation solutions, there needs to be one trustworthy group to focus and filter information. The core team will be this group, listening and learning from existing research and new proposals as they pull together a focused, unified vision.

- **Passion**

Each member of the core team, regardless of specialization and expertise, must be driven by a passion for the mission and positive change.

- **Design-based thinking**

Applied to future scenario planning and complex systems integration, designers' critical thinking, deciphering, editing and problem-solving techniques will ensure that solutions are compelling to all stakeholders, particularly the American public. The original Futurama exhibit used design to develop and deliver its vision, illustrating and communicating in vivid detail how new, previously unimagined transportation options could transform the entire nation. **Futurama 2.0** needs the integral involvement of designers so that it can successfully transform the nation again.

- **Systems approach**

Each core team member should operate under the overarching premise that **Futurama 2.0** will be all about integrated systems.

- **No self-interest**

The team must examine and communicate all ideas based on factual truth and validated, human-centric, economic and scientific principles—independent of single-interest, commercial, political or institutional ideology.

- **Human systems**

Equal emphasis must be placed on developing and modeling complex human organizations that can deliver creative, viable solutions. The challenge of orchestrating diverse disciplines is probably much greater than developing complex physical solutions and an important reason why design-based thinking will be a key component of the group.

- **Education**

The core team will educate the public based on truth rather than corporate, political or special-interest agendas about the impact transportation choices have on our future.

- **Sensitivity**

Awareness of America's diverse cultural, economic and topographic landscapes is essential. The core team must maintain overall sensitivity to and respect for regional differences in these three categories while making recommendations.

Disciplines Represented on the Team

The core team would, among them, have an excellent overview of all the required disciplines that are part of a comprehensive national transportation system. Each individual would represent several relevant, interconnected disciplines. Examples of inter-connected disciplines might be urban planning, architecture, and regional government policy; or, freight logistics, port authorities and the trucking industry; or, systems engineering, national rail infrastructure and freight tracking systems. Each member of the core team would reach out to specialists in his or her broad field to outsource detailed studies that would contribute to common goals. This organizational structure would give **Futurama 2.0** much greater reach than the original Futurama creators had.

The breadth of disciplines ultimately involved could be summarized as follows:

- Architecture
- Aviation
- Civil engineering
- Communication design
- Digital systems design
- Documentation
- Ecology
- Economics
- Energy
- Freight logistics
- Futurist studies
- Government policy and regulatory agencies such as DOT and DOE
- Homeland Security
- Industrial systems design
- Information technology
- Linguistics
- Marine architecture
- Oceanography
- Poetry
- Political science
- Process design and management
- Rail
- Social science
- Systems engineering
- Transportation engineering
- Transportation design
- Urban planning
- Venture capital and investment
- Writing
- Web and interaction design

The list of disciplines is not meant to be definitive, but illustrates the range of activities needed to bring insight and creativity into this complex subject matter.

Team Charter and Operating Model

The following outlines a basic operating model for the core team, including process, scope of responsibility, funding and reporting/accountability.

The core team would:

- operate within the mandatory requirements of transparency and accountability of the Office of Management and Budget (OMB).
- operate for pre-agreed periods of time in phases that deal with assumed short-, medium- and long-term objectives. The first phase to establish the overall, big-picture **Futurama 2.0** vision might be one to two years long. Subsequent phases that deal with creating the blueprint from which policy can be derived with confidence, would likely last over several years.
- be given a federal budget to outsource detailed research projects to develop, model and validate specific elements. These research projects would be tendered to academic, non-profit or corporate research institutions. Selection procedures and delivery expectations would be rigorously managed with transparency and appropriate accountability.
- take final responsibility for defining, articulating and presenting long-term, viable, validated, complex, all-embracing transportation systems solutions from which the federal government could formulate detailed and long-term policy.
- remain independent rather than affiliate with any existing government department or agency. Solutions and expertise needed for **Futurama 2.0** reach across many government agency interests—energy, transportation and security, for example—therefore, to remain impartial it is better for the core team to be independent to maintain a panoramic perspective.

Putting together a team with depth of knowledge, diversity of knowledge and the capability of delivering a truly compelling, viable and achievable blueprint is on the scale of the Manhattan Project. Collaborative people management will be as important in this project as the generation of outstanding, futuristic transportation solutions. The team must provide not only the vision but also the follow-through.

Acting Now While Looking Ahead

A mandate from the White House and appropriate federal funding would be critical to ensure that such a team could be put together in a timely way.

A far-reaching and expansive future transportation vision and blueprint will require short-term, medium-term and long-term solutions. Timing is crucial: the sooner the team can begin, the better for America's future.

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Short-term planning would help the current, disabled auto industry survive long enough to participate in and contribute to medium-term (5-10 yrs) solutions; medium-term planning would build the preparatory foundations for all-embracing, long-term (10-50 yrs) solutions; long-term planning (50+yrs) is crucial because future transportation solutions are fundamentally tied to future urban development solutions, which take decades to develop and implement.

Funding should be sufficient to engage the high caliber core team of outstanding minds who in turn would outsource and coordinate detailed research and development work to the best, most innovative thinkers, experts and research organizations from each of the necessary contributing disciplines.

Methodology :

Multi-Disciplinary Research

Based on Big-Picture, Design Thinking

In a complex world, visions and solutions can no longer develop in isolation—planning for the future should involve all stakeholders. Multi-disciplinary task forces are the answer. Just as important, though, are solutions that are compelling to end users as well as to business and industry; otherwise, regardless of their technical or logical brilliance, the solutions will not be accepted. For these reasons, design and **design thinking** need to be an integral part of the research and creative process.

Design refers to far more than just creating alluring new products or services. Design is about defining and understanding the problems to be solved, facilitating open-minded inquiry, exploring abstract ideas early in the process, spotting opportunities that are not at first obvious, working with diverse stakeholders, balancing the needs and expectations of end users with those of enterprises or providers and presenting complex ideas in a format that anyone can easily comprehend.

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The working culture of design offers unrivalled levels of facilitation that allow multi-disciplinary teams to develop valid solutions for the future. Design processes can provide the special leadership, skills and environments within which diverse disciplines and cultures can function properly. There are plenty of individual experts in areas related to future transportation and mobility—they are, however, frequently biased toward one particular solution. For instance, automobile researchers tend to solve their problems with alternative cars, rail experts advocate new trains, and so on. Needed are new, broader visions and solutions that are unencumbered by old and established ways of thinking. Design culture can break down those incumbent practices and

prejudices by ensuring that all viewpoints and ideas are acknowledged, discussed and considered with an open mind.

Many valid solutions exist but they must be applied as and where appropriate, interacting with each other seamlessly. Similarly, future-thinking experts representing all stakeholders must interact seamlessly, with open minds and the desire to work for the common good. **Futurama 2.0** requires such a core team to define it.¹

Systems thinking will also be an extremely important requirement of the **Futurama 2.0** core team. Systems thinking considers how a complex entity operates as a whole and how it interacts with its surrounding environment. This way of thinking helps to identify emerging patterns, cycles and structures in the whole system rather than just focusing on the individual subsystems. The successful realization of a complex national transportation network will require a full understanding of how the individual systems interact to create a seamless whole.

To function with high performance, this team needs a clear and motivating purpose, an environment without political pressures, and adequate funding to attract and recruit the appropriate people. After receiving clear mandates, the core team needs time to discuss, research, conceptualize, evaluate, refine, model and validate extremely complicated solutions that will have a very high probability of delivering a **Futurama 2.0** capable of enabling the **Great American Dream 2.0**.

¹ The Santa Fe Institute is an interesting early, successful example of a multi-disciplinary research group, whereby groups representing distinctly insular scientific disciplines realized that sharing their theories and research accelerated mutual progress. While this institute's focus is not specific to transportation, the way that it formed and operated can be informative to a **Futurama 2.0** core team.

The goal of **Futurama 2.0** is to reliably inform national policy for the future development of integrated urban landscapes and transportation networks with subsequent, significant, long-term investment. To meet that goal, **Futurama 2.0** needs to be **right**. In the past, well-meant initiatives for huge public projects have failed because unintended consequences were not foreseen—the original **Futurama**'s inability to anticipate environmental consequences being a prime example. This time, the **Futurama 2.0** core team would focus on serious future scenario development, continually anticipating unintended consequences of proposed solutions. This would create valuable feedback loops to model and analyze.

Early development phases of **Futurama 2.0** should be shared with the public in a similar fashion to that of the 1939 World's Fair, where a brave new mobility world was presented to the U.S. public. Forty-five million people attended that exhibit—and they left filled with excitement, optimism and vision. Education helped energize and encourage political leaders to implement the policy to make it happen, knowing that they had the enthusiastic support of the American people.

Education needs to be another significant goal of the independent, multi-disciplinary core team. Many people in business and politics—even the general public—are unconcerned or unaware of many issues concerning energy, environment, water and climate change, and how these relate to a new approach to transportation in America. Presenting poignant, factual and reliable information, clearly and thoughtfully articulated, could do much to erode vested interests and fear of change. With emerging communications tools as well as interactive television and the Internet, the public can be informed, involved and enthused without the necessity of cumbersome, traveling, physical models.

Other regions of the world, particularly the European Union and China, are already investing in transportation research at national levels. For the United States to rebuild itself as a societal and economic model for the world, it too must invest in reinventing the way it moves its people and goods. Cross-representation among research groups and other national and international initiatives will allow knowledge-sharing as teams learn from each other. **The time is right.** America has the potential to develop a compelling and implementable **Futurama 2.0**, demonstrating once again our ability to produce extraordinary solutions.

Fourfold Motivation : Providing a Robust Framework to Advance Other National Priorities

Futurama 2.0 can hold America to the highest **ecological standards**, provide our country with **long-term prosperity**, offer **social equity** and establish greater **national security**.

The Highest Ecological Standards

One reason that the original 1939 Futurama became so successful was that environmental responsibility was **not** a public or political concern at the time. The consequences of industrial effluent and vehicle emissions were not understood, and in a time of optimism, the planet's natural resources were assumed to be infinite. America's leaders created a vision based on the priorities of that era, so the ingredients for a successful outcome were in place.

Today, however, a swelling global awareness of mankind's effect on our ecosystem has brought us to a tipping point. Vigorous debate about the extent of damage and how to redress the situation will continue, but the time for action is now. The movement of people and goods will be as fundamental to future American prosperity as it has been in the past but prosperity can no longer be at the expense of our environment. Therefore, one of the top priorities of **Futurama 2.0** will involve quantifying the environmental impact of proposed solutions.

As the core team reinvents future transportation networks, it will face the reality that the familiar ingredients of the past are no longer abundantly available to ensure success. The highest ecological standards should be a fundamental requirement of every component and subsystem of **Futurama 2.0**. The **Futurama 2.0**

core team would be accountable for defining these goals and how they will be met.

America's future transportation and mobility blueprint will minimize dependence on environmentally harmful, carbon-producing and non-renewable energy sources. However, while choosing cleaner energy sources (preferably domestic) is important, actually reducing the demand for energy is even more important. An overarching and integrated approach to America's future transportation and mobility will focus on reducing or even avoiding the need for moving people and goods around in the first place. Localized food production and desktop manufacturing technologies can reduce fuel consumption. Changes like these—in conjunction with radical approaches to urban planning, zoning and citizens' working/living relationships—will yield far more impressive reductions in national energy demands than simply reducing the average fuel consumption of automobiles. To achieve the highest ecological standards requires a fully integrated, systems-thinking approach.

The United States is not solely responsible for the world's ecological abuse; yet, **Futurama 2.0** presents an extraordinary opportunity for this nation to take global leadership in developing future transportation solutions that keep raising ecological standards until our environmental footprint is no longer a concern. This will not be easy, so it must be a prerequisite that the development of **Futurama 2.0** clearly informs policy-makers and legislators.

National Prosperity

As the current White House administration vows to stimulate the floundering American economy through direct investment in American infrastructure, it has a

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unique opportunity to revitalize struggling American industries and workforces to build long-term prosperity—not just give it a short-term shot in the arm. This opportunity will come from federal and state governments creating judicious demand through far-reaching stimulus packages. The White House administration has a profound responsibility to ensure that it knows the types of demands to create.

For instance, the government can do far more than settle for asking the American auto industry to focus on developing fuel-efficient automobiles. Instead, it can also encourage development of other kinds of products badly needed by the United States—products similar in complexity and scale to automobiles, such as wind turbines; light-rail or subway cars; personal rapid transit system hardware; modular, low-cost housing systems; and transportation infrastructure hardware.

Many traditional American automotive jobs and factories are disappearing, but here is an opportunity to re-engage a significant number of talented and skilled automotive designers, engineers and manufacturers to help create a new American transportation future. Just as America pioneered the mass production of automobiles during the twentieth century, so it has a chance to channel this product development skill, knowledge and manufacturing ability into future, sustainable, compelling mobility and transportation systems for the twenty-first century.

This could inspire General Motors, for example, to re-envision its future as the General Mobility Corporation and provide much more than metal boxes with wheels. It could become a transportation service provider that not only builds the mobility devices but also helps manage and provide an array of interconnected solutions for personal, public and goods trans-

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portation. This business model would be much more flexible and robust than the status quo of just designing, building and selling cars, which is unsustainable for most car manufacturers today.

Private industry is unlikely to undertake a changeover of this magnitude on its own, given the level of risk and investment uncertainty. Private enterprise will only invest in the development of new products if it is quite certain that there will be sufficient customers for those new products, to justify the investment, amortize their costs and reap sufficient profit. So when it comes to changing the genre of products it makes, an enterprise will be even more circumspect about investing in new technologies, skills and methods, for these will cost significantly more than simply extending an existing product line. For an entire industry to change, the risk becomes critical. In addition to the cost and risk involved, this industry-wide transition would also require time for workforces to acquire new knowledge and skills as they adapt from their existing competencies.

Federal, state or regional governments, with the funding to become major customers to American industry, have a great opportunity to convince much of the troubled legacy industries to change their ways. If the legacy industries know that they are guaranteed substantial return, they are more likely to make a calculated decision to invest in their facilities, employees and research in order to develop and manufacture new kinds of products. This, in turn, will lead to the long-term prosperity of these industries and their employees. Also, this new collaboration between government and industry, while a politically controversial issue, enables the government to more effectively influence a new social, technological, economic and ecological way forward for the nation.

Where there is a substantial demand, private enterprise will follow, providing the required technologies, hardware, software and infrastructure. Defining a vision and a blueprint, implementing policy and creating demand must take place if the United States is to reinvent itself, regardless of whether the current auto industry significantly contributes to our next great transportation and mobility revolution.

Social Equity

Our way of life in the United States of America is dependent on the automobile, which, just as the original Futurama envisioned, has become the overwhelmingly dominant means of personal mobility. Shopping malls, rail stations, theme parks, airports, business campuses and many schools all too often assume access by car. Those too young or too old to drive, those on low incomes who cannot afford a car, and those with disabilities related to sickness, age or accident are at a huge disadvantage. They also represent a significant percentage of the population. They struggle with their day-to-day mobility and are, therefore, unable to fully participate in or contribute to the economy.

Without a profound change in the way we think about mobility, the proportion of people without convenient access to transportation will grow dramatically. The Census Bureau reports that by 2030, nearly one in five U.S. residents is expected to be 65; and by 2050, that age group is projected to more than double the number in 2008.² Their numbers are growing significantly, while their mobility options remain few.

2 United States. U.S. Census Bureau, An Older and More Diverse Nation by Midcentury, 14 Aug. 2008. 25 June 2009. <<http://www.census.gov/Press-Release/www/releases/archives/population/012496.html>>.

Transportation issues for the poor, who must travel to multiple workplaces at inconvenient times, are at the root of a vicious cycle of downward poverty. It is time for all Americans to experience the benefits of a truly prosperous nation that offers flexible, affordable, convenient and efficient transportation options.

Interestingly, alternative modes of transportation that are designed to be safe, accessible and convenient will benefit everyone, not just those currently marginalized. Seamless personal mobility would allow all segments of our society more employment opportunities, greater access to education, better options for recreation, an improved social life and a way to cope better with the demands of domestic life. New generations of smart, automated, highly energy-efficient and shared-access automobiles can be included in the choices offered to our population but smart urban planning with well-considered, integrated transportation systems will give more people better choices.

National Security

As the world gets more complex, opportunities for unwanted interference rise. Troubling evidence suggests that outside forces are already able to tamper with American infrastructure and intellectual property through cyber spying and hacking. As recently as July 2009, cyber attacks besieged several private and U.S. government Web sites including the New York Stock Exchange, Defense Department and Federal Aviation Administration. While the attacks were relatively unsophisticated, they exposed weaknesses in defense systems that may leave vital areas such as transportation vulnerable to a more debilitating hit.³ Creating a visionary transportation policy for the United States will provide opportunities to build a more secure nation.

While the solutions and reach of transportation and energy networks will be a nationwide effort, their implementation and operation should be as localized as possible, with built-in strategic redundancies to maintain national security. A smart, insightful and visionary **Futurama 2.0** will decrease reliance on centralized energy grids, control systems and administration. As a result, outside forces will find it far more difficult to wreak havoc across the entire nation.

Dependence on foreign oil is a transportation issue. The United States is currently encouraging development of fuel-efficient or alternatively propelled automobiles and trucks to reduce our dependence on oil. This is a step in the right direction, but **Futurama 2.0** will seek far more dramatic goals of little or even zero reliance on oil of any kind, overseas or domestic. In terms of national security, this will essentially eliminate the issue of any foreign threats that might result from our dependence on oil consumption. **Futurama 2.0** will also seek to leverage renewable energy sources, both those currently known and those yet to be developed.

3 Gorman, Siobahn & Ramstad, Evan. "Cyber Blitz Hits U.S., Korea." *Wall Street Journal* 9 July 2009. 9 July 2009. <<http://online.wsj.com/article/SB12470180617620969.html>>

Formula for Success : Ensuring **Futurama 2.0**

Creating **Futurama 2.0** as proposed in this white paper is a critical undertaking requiring a significant public investment. This means that there would rightfully be high expectations placed on **Futurama 2.0** to successfully drive and inspire national policy that is acceptable to all stakeholders.

Factors that will contribute to a successful outcome for **Futurama 2.0** include:

- Presenting an exciting vision that inspires the American people to embrace positive change
- Clearly articulating and presenting solutions that are easily understood by all stakeholders
- Generating sufficient public support to build the political will to back the vision
- Gaining enthusiastic, sustained support from government agencies
- Presenting abundant opportunity for private enterprise to contribute and profit from its implementation
- Foreseeing the far reaching consequences of **Futurama 2.0** through careful modeling and analysis
- Exceeding U.S. greenhouse gas and emissions goals
- Becoming self-energizing and sustainable over time as **Futurama 2.0** gains momentum—its advantages will inspire private enterprise to see the job through
- Demonstrating improved health and quality of life for the majority of Americans
- Inspiring other nations
- Learning continually through rapid prototyping and advanced feedback loops

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CONCLUSION

Futurama 2.0 : A Vision that America Desires

The world is entering an era of many unpredictable changes, shifting balances of power, ecological catastrophes, peak oil, climate change, exponentially advancing technologies and increasing human population. Transportation underpins it all.

The authors of this white paper believe strongly that now is an auspicious time to unleash a step change towards a national transportation system that prepares America to take the lead in redefining mobility and transportation.

The vacuum left by the domestic car industry can be filled. Hundreds of thousands of talented, skilled designers, engineers, technologists and manufacturers are ready to reapply their energies to a concept of transportation broader than just automobiles. It has already been proven before that American industry can respond extremely fast to change given the right incentive: In 1941, enterprises large and small, particularly in Detroit, rapidly shifted their output to wartime production. New designs for military needs were quickly created and almost overnight, industry retooled to mass produce tanks, airplanes, ships and equipment.

Creating exciting new jobs in America for Americans complements the concept of the global economy, because America thrives on leading the world in new directions. The world needs radical new solutions to balance demand for mobility and transportation with this planet's dwindling ability to supply the required resources and handle the effluent.

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At a time when the White House administration is bold enough to initiate the necessary changes to be made, **Futurama 2.0** offers the administration a way to generate optimism and solutions based on a fully researched and validated vision that the American people can trust and enthusiastically support.

AUTHOR'S CREDENTIALS

Industry, Business, Academia and Design

The authors of this white paper, David Muyres and Geoff Wardle, specialize in future studies for the automotive and transportation industries. Both have many years of significant professional experience within the global automotive industry in design and product development.

In addition to their years of practical experience in the transportation industry, they both have been involved in full-time design education. They have a unique blend of hard business experience and academic inquiry.

Their business and educators' experience has given them firsthand knowledge of the importance of creativity and multi-disciplinary collaboration in delivering outstanding, successful solutions. They also understand the inherent challenges of facilitating multi-disciplinary collaboration towards a successful outcome.

They are currently focusing their energies into researching and advocating innovative design-based processes to create future, sustainable transportation solutions. Together, they represent a nucleus of opinion based on focused and broad research into the future of sustainable transportation in an increasingly challenged global economy and global ecology. Muyres and Wardle advocate that design thinking and innovation should be at the core of all conversations and activities that concern the future of mobility, whether it is the future of the automotive industry or the larger, more complex issues of personal and freight transportation at large.

They have been central to the creation of a series of five annual summits on Sustainable Mobility at Art Center College of Design in Pasadena, California

(www.artcenter.edu/summit). These summits bring together leading sustainability, transportation and auto industry experts, scientists, politicians, developers, legislators and policy-makers from around the world to discuss the significant challenges that the developed and developing economies of the world face in providing ecologically and economically sustainable transportation.

Inspired by lessons learned from the first of the Sustainable Mobility Summits, Muyres and Wardle, along with their colleagues Lloyd Walker and Andy Ogden, developed a deck of cards as a future scenarios tool for envisioning mobility futures (www.mobilityVIP.com). It is designed to encourage long-term, visionary thinking about transportation and mobility among diverse disciplines. It has been enthusiastically received, and there are plans to develop the tool for other fields.

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Future transportation solutions will have to meet far more exacting requirements than in the past, especially given the heightened complexities of integrated transportation systems. To address these complexities, a much greater array of research, planning and implementation expertise will be required, involving specialists from many disciplines. However, regardless of the technical and logical brilliance of new solutions, they will not be embraced or implemented if the end user is not excited or willing to use them.

That is why Muyres and Wardle believe that it is imperative to involve designers in important, far-reaching research. Visionary designers can contribute far more to the success of complex transportation systems solutions than just providing alluring style. They are equipped to create, lead and expand visions at the exploratory stages of research, increasing opportunities for truly innovative approaches. Designers are also very adept at facilitating cross-disciplinary collabora-

tion, ensuring that all the main goals of a vision are respected throughout development and that the needs of the end user are always a priority. Design balances a compelling customer experience with the economic and technical needs of the enterprises that provide the systems. Designers and their processes can ensure that innovative visions turn into pragmatic realities.

Aside from their philosophy and mission, Muyres and Wardle would like to make it clear that they have no corporate, institutional or political agenda to pursue. They are solely motivated by a desire to bring together the best and brightest minds, and by their profound belief that these minds will objectively determine mobility and transportation system solutions that are compelling for a sustainable future.

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Bio: DAVID MUYRES

David Muyres most recently held the position of Vice President, Educational Initiatives, for Art Center College of Design in Pasadena, California. In this capacity, Muyres was responsible for developing new strategic offerings for the college. These ranged from educational programs targeted to business executives in order to demonstrate the value of creative process and design thinking, to ArtCenterPRO, a unique program in which companies, as sponsors, collaborate with Art Center students to create real-world design solutions. Muyres was also responsible for masterminding and directing the Art Center Summits, a series of unique annual events focused on sustainable mobility (www.artcenter.edu/summit). The summits have brought together global business, technology, design and governmental leaders to discuss the future of sustainable transportation—they explore creative new systems and business models that inspire people to think differently about how we all move around the planet.

Prior to joining Art Center in 2005, Muyres worked at Johnson Controls Inc. (JCI), where he held various functional and executive management positions within the automotive division in the United States, Europe and Asia. As Vice President of Design and Consumer Research in Germany, he helped create JCI's European Design Center. In Japan, he served as Vice President and General Manager for all Product and Business Development. During his tenure at JCI, he received six patents. Muyres grew up in Minneapolis, Minnesota. He studied mechanical engineering and philosophy at Rensselaer Polytechnic Institute in Troy, New York, and graduated from Art Center College of Design in Pasadena, California, with a Bachelor of Science in Transportation Design.

Muyres has spoken about the future of mobility at events around the world and currently advises for other mobility-related events and organizations such as the University of Michigan's SMART and its annual mobility conference; Opportunity Green's annual business and sustainability conference; and Pasadena Sustainable Transportation Action Committee (PASTAC), a sustainable mobility organization led by CALSTART. In December 2008, Muyres was asked to provide testimony on the future of the automotive industry to the Congressional Select Committee on Energy Independence and Global Warming, chaired by Rep. Edward J. Markey. Muyres also acts as a design advisor to various start-up mobility and transportation companies and is assisting in the creation of the new Center for Innovation and Applied Design in Michigan.

Muyres has a profound interest in bringing the best and brightest minds together to re-envision the transportation industry. He strives to leverage his global industry experience, creative approach and the power of his broad network to develop solution-minded partnerships committed to creating more efficient ways of moving people and goods around the planet. Muyres recently joined forces with Hunt Green LLC in Washington, DC to further integrate sustainable mobility solutions into newly emerging national policy.

Bio: GEOFF WARDLE

Geoff Wardle is Director of Advanced Mobility Research at Art Center College of Design in Pasadena, California. Wardle is also part of the managing team that has been planning and delivering Art Center's "Designing Sustainable Mobility" series of summits, the first of which was held in February 2007 (www.artcenter.edu/summit).

With a bachelor's degree in mechanical and vehicle engineering from the University of Hertfordshire (UK) and a master's degree in automotive design from the Royal College of Art in London, Wardle has had extensive experience as a professional vehicle designer across four continents. Although he remains interested in the culture of cars, Wardle's career as a designer in the automotive industry caused him to become increasingly concerned about the future sustainability of personal mobility and transportation in general.

With more than a decade of full-time involvement with Art Center's Transportation Design department in California and in Europe, Wardle has continually advocated for transportation designers to become far more concerned and involved with the many other disciplines that make up mobility in its entirety, particularly in the urban environment.

His deeply held interests focus on the role that designers can play in helping developed and developing economies transition gracefully from an unsustainable level of consumerism, to compelling, ecologically and economically sustainable economies that focus on a high quality of individual experience, comfort and reward. Within this broad horizon, he is committed to leading opinion and expertise on the future of mobility and transportation and to serving as a valuable

resource for industry or government. He sees that the approaches to innovation, creativity and research that designers use are highly effective for other disciplines and activities.

As Director of Advanced Mobility Research at Art Center College of Design, Wardle lectures and leads investigations into all kinds of transportation in conjunction with students and faculty. Research projects focus on balancing the needs and expectations of transportation consumers with valid business and technology parameters through systems thinking and awareness. Research projects have included the future of urban bus travel (Santa Monica Big Blue Bus Company), new categories of personal commuting vehicles, personal rapid transit (PRT) systems and holistic approaches to urban development and integrated transportation systems.

Aside from his role as a researcher and educator, Geoff Wardle works with select vehicle companies as an external advisor on futurist and design strategies. In December 2008, he testified on the future of the automotive industry before the Congressional Select Committee on Energy Independence and Global Warming, chaired by Rep. Edward J. Markey. Wardle has been called as an expert witness on design-related patent infringement cases and served on the board of advisors for the Progressive Insurance Automotive X PRIZE. Wardle is frequently invited to speak at conferences and symposiums related to the future of transportation and the automotive industry. He has also spoken about these topics on National Public Radio.

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